The Successful Trinity

MR. PAPER MILL EXECUTIVE, are you sure that you realize the assets you possess? Have you taken a recent inventory of the factors in your business that should and can produce profit? Are you certain that you have co-ordinated these factors and that they are working co-operatively and harmoniously to a definite and profitable purpose?

A prominent sky-pilot in a recent selling campaign well said that the three factors necessary to success in such a campaign were: 1—An idea. 2—Personality. 3—An organization. We have neither the time nor the space to set forth his application of these three principles to his campaign, but believe us when we say that this old veteran salesman of the hardest line of merchandise on earth proved his point conclusively. And it is germaine to our purpose to apply his analogy to the paper industry.

The idea—in our industry—stands for the paper product, whatever it may be. Now a paper product in the general sense has this advantage over the great variety of commodities: it is an essential commodity, and provided the product is economically produced, on the basis of a continuous, standard, reliable value, the idea has been complied with.

But as is well known, no commodity, no matter how well produced or how full of intrinsic value, brings any wealth to the producer until it is coupled up with personality. A mine of purest gold with a man sitting on top of it, but far removed from the mass of humanity, is valueless to its owner until a personality appears that recognizes the problems involved, solves them and brings the metal into the stream of commerce which it was destined to serve.

Personality has never been defined, for a true definition must be able to embrace within definite lines the entire scope of the term, "define" with just as few exceptions as possible. And personality—those human forms, animated by the intangible and spiritual force that is able to discern, able to produce, able to accomplish, able to relate and perform, in all the various degrees from the mediocre to the zenith—is the propagating necessity in the second factor in the equation of success. We have too many mills today that are content to rely on production, in which department outstanding personality is not an absolute requisite for its success. But in the complexities of this twentieth century merchandising and distributing problem, we have recognized at last that products need outstanding personalities to propagate them. Every executive is under obligation to himself and his investors to obtain the best—the strongest—the most vibrant, sane, enthusiastic personality for the propagation of his products.

But that is not all; the executive needs to understand that they must be backed up by an organization.

Now an organization, to live and grow, must take on the character of an organism. It is not the spectacular nor the abnormal that lives lastingly, but those organisms containing life which nature shows us, starting small and growing large, because they are founded on the bedrock of economics, sanity and righteousness.

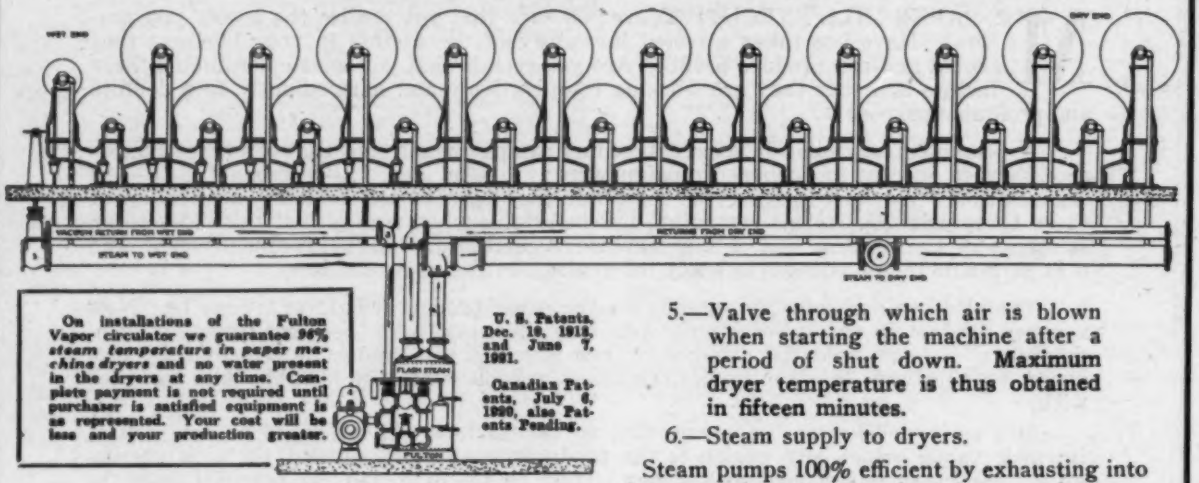
We say without the slightest fear of contradiction that the time has come when those corporations in the paper industry will not only survive but grow in favor with men and the world at large, who have apprehended, made their own and contain within themselves this trinity of successful elements. An essential product is propagated by outstanding personality, underwritten and sustained by an upstanding organization. By an upstanding organization we mean one in which all departments are co-ordinated and co-operate and articulate with the least possible friction and the greatest harmony. These will live.

Mr. Paper Executive—make an analysis of your business. Take it as a man of science does a ray of light, and break it through the prism of this trinity into its component elements, and find out to what degree it contains these three essentials. And if there be any lacking, see that the deficiency is remedied—the quicker the better, the sooner the surer!

The FULTON Forced Vapor Circulator

KEEPS ALL WATER OUT OF DRYERS

Reduces Fuel Consumption—Increases Production



On installations of the Fulton Vapor circulator we guarantee 96% *steam temperature in paper machine dryers* and no water present in the dryers at any time. Complete payment is not required until purchaser is satisfied equipment is as represented. Your cost will be less and your production greater.

U. S. Patents, Dec. 19, 1916, and June 7, 1921.

Canadian Patents, July 6, 1920, also Patents Pending.

THE FULTON FORCED VAPOR CIRCULATOR

The operation and the principle of this system is not in the least complicated. It is, on the other hand, extremely simple as will be readily noted by means of the accompanying drawing. An explanation to this drawing is given briefly in the following:

1.—Return from dry end and steam supply to wet end.

2.—Steam to wet end.

3.—Vacuum return from wet end to pump.

4.—Vacuum pump. Steam or electric pump may be used.

5.—Valve through which air is blown when starting the machine after a period of shut down. **Maximum dryer temperature is thus obtained in fifteen minutes.**

6.—Steam supply to dryers.

Steam pumps 100% efficient by exhausting into the wet end dryers, therefore the cost of removing air and water from the dryers is practically nothing.

With this system practically 75% of the dryers constitute the dry end of the paper machine. By drying paper with less steam or vacuum on wet end gives a wider, stronger and better finished sheet and prevents cockling. Vacuum on wet end allows operation of steam at zero pressure or vacuum and no water in dryers.

All return water from heating coils in the mill can be piped to the Fulton Vapor Circulator and returned to the boilers with water of condensate from paper machine. No additional cost. No traps. Insures 100% coil efficiency.

It is not necessary to stop production while installing the Fulton Circulator since there are only three connections necessary, 1, 2 and 3.

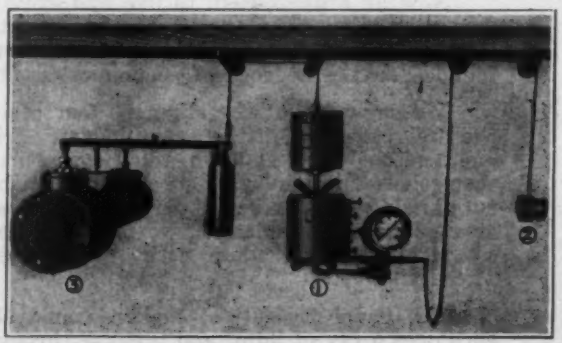
DEMON STEAM PRESSURE REGULATOR

It is impossible to waste steam where the Demon Regulator is on the job. It stands as an ever alert watch over your coal pile. It also insures perfect steam regulation, for the live steam in inlet and exhaust valves is controlled by the pilot cylinder—1.

The remote control is placed on front side of paper machine—2. One operation of this controls incoming steam and exhaust.

Where this regulator is used, master valves are placed in the steam lines—3.

The Demon Steam Pressure Regulator is built in all sizes and for all pressures.



U. S. PAT. MAY 2, 1922

Why not ask us what we can do for your machine—it costs nothing

The FULTON ENGINEERING COMPANY

MIDDLETOWN, OHIO

It Was a Big Success!

THE First Paper Industries Exposition has been declared a huge success! The last booth dismantled, it has now become a chapter in the history of papermaking progress and achievement. The throngs which crowded this display of machinery, chemicals and finished paper products have dispersed to their several parts of the continent. In another week or two, the peak of enthusiasm will have subsided and the industry will settle back into its work-a-day routine. And not until then will the full amount of success attained by this first paper exposition be fully realized.

As humble dealers in public opinion, we must say that the interest evinced by paper manufacturers, converters, jobbers, printers, publishers, and by no means the less important—the ultimate consumer, has convinced those who did exhibit that the idea of a paper exposition is a winner and that the next year would undoubtedly see a more elaborate display of their products.

From the live interest shown by the women in the displays of dishes, milk bottles and other converted products, the opportunity will very likely be taken next year to exhibit this department of the industry in a larger, more complete and educational manner.

We feel sure that now a start has been made, paper manufacturers are going to study the proposition pretty carefully and determine in their own minds wherein such an exposition will be the best benefit to them and accelerate the progress of their industry. When their first spurt of enthusiasm has cooled, they are going to sit down and face the faults of this first one (which were few), acknowledge the good points (which were many), and plan for a 1924 exposition that will be even more beneficial to the industry than the first.

One of the strong points on the program of the Exposition was an exceptionally well arranged group of speakers dealing with the subject of food packaging. As carried out, this section of the program proved to be of great educational value. One regrettable feature, however, was the limited attendance of the so-called "public." Those who did attend were intensely interested and expressed a desire that this phase of the Exposition be even more extended next year.

Indicating the rapid progress which the paper and pulp industries have made and are making, were many new machines and processes which were brought before the industry at the Exposition for the first time. The advisability of this was the subject of discussion of many informal groups. Many manufacturers intend to hold any new products which they may perfect during the coming year and present them, entirely new, to the industry at the next exposition.

We believe that the paper industry has started something—something of genuine merit—but empty enthusiasm generated by the bright lights of the show is not going to give support to this splendid start. It will take co-operative work on the part of Association members, converters, machinery and supply houses to put this thing on a plane where it will be recognized not alone by the industries of the nation as a big annual event, but by the paper consuming public as well.

The committee in charge and the managers are to be highly commended for the excellent and helpful way in which they put over this First Paper Industries Exposition. It was their task to work from the ground up, and they performed it in a masterful way.

Stock Pumps or Water Supply!

ABOVE is pictured an "American" Centrifugal Pump handling pulp stock in the Thilmany Pulp & Paper Company at Kaukauna, Wisconsin.

Many paper mill engineers demand that whether it be a deep well turbine for water supply, a force pump for acids, or centrifugals for handling stock— it shall bear the name plate of the American Well Works!

Manufacturers for over half a century of centrifugal pumps, deep well plunger pumps and deep well turbines.

DISTRICT SALES AGENCIES:

NEW YORK CITY (Domestic and Export)
PHILADELPHIA, PA.
PITTSBURGH, PA.
ST. PAUL, MINN.
SAN FRANCISCO, CAL.
LOS ANGELES, CAL.
ARTESIA, NEW MEXICO
TAMPA, FLA.
JACKSONVILLE, FLA.
CHARLESTON, S. C.
BIRMINGHAM, ALA.
SALT LAKE CITY, UTAH
DENVER, COLO.
KANSAS CITY, MO.
JOPLIN, MO.
ST. LOUIS, MO.
DALLAS, TEXAS
GRAND ISLAND, NEB.
ALMYRA, ARK.
DETROIT, MICH.
MONTREAL, CANADA
CALGARY, ALTA., CANADA
EDMONTON, ALTA., CANADA

THE AMERICAN WELL WORKS

General Office and Works
AURORA, ILL.

Chicago Office
FIRST NATIONAL BANK BLDG

EDITORIALS

Accident Record of Paper and Pulp Mills

THE Paper and Pulp Section of the National Safety Council has completed the compilation of the 1922 accident record. Reports were supplied by 55 plants with an aggregate employed force of over 30,000. Details of this record will be found on another page in this issue.

It is no secret that the industrial world as a whole, is yearly turning more and more attention to the practice of safety. But until recently, the paper industry has viewed the various safety movements at arm's length, with a tentative pat here and a cautious poke there, in a manner similar to the way we used to inspect the "new horse," when youngsters back on the farm—always ready to jump at a switch of the tail. During the past few years, however, paper makers have been gaining confidence in the safety movement and as this confidence increased, so did the value of the movement to the industry.

This record compiled by the Paper and Pulp Section of the National Safety Council is considered by some, to be the most complete accident record in any industry. This alone indicates a healthy, growing confidence in safety among paper manufacturers. And the results of this record are proof that this confidence in a safety movement for paper mills is reacting in a reduction of lost time accidents.

The National Safety Council is to be highly commended in its task of preparing this record of the paper and pulp industry.

"All Work and No Play—"

A SPECIAL committee on Work-Periods in Continuous-Industry, of the Federated American Engineering Societies has, through extensive investigation, arrived at some very interesting conclusions. Much of their effort was directed toward a discovery of the correct relation of the length of working shifts to individual efficiency. On this subject the committee reported as follows:

"The effect of the eight-hour as compared with the 12-hour shift operation on the quantity and quality of production has been satisfactory where good management and co-operation of labor have been secured. In practically every major continuous industry there are plants which have increased the quantity of production per man as much as 25 per cent."

This report rather dissipates the idea that the more hours a man puts in, the more work he does. A man working a twelve-hour shift instinctively starts out "taking it a bit easy" to save his strength; by the time he begins to exert himself he is too fatigued to be at his best.

Further on this subject, let us quote from a letter written by the President, Warren G. Harding, to Mr. Ferry, of the Armstrong Bureau of Related Industries:

"I know of nothing which will contribute so much to American industrial stability and add so much to American industrial happiness as the abolition of the twelve-hour working day and the seven-day working week. This is far too heavy a draft upon the energies of the workmen employed in any industry and it conforms to our best American ideals to bring about this abolition of excessive hours and excessive days in order that the working forces may have time for leisure, for diversion, for indulgence in the becoming luxuries of life and for a fuller participation in that family life which is essential to the full enjoyment of American freedom and opportunity."

In overcoming this evil of long hours—and we consider it an industrial evil—we believe that there is enough true Americanism and sincere reverence for the Golden Rule in this country to overcome all fragments of opposition to it.

"Westward Ho!"

THE West—an element of romance seems to ooze from between the letters of these two words.

The West—the object and disillusionment of numerous utopian dreams.

Back in '49, people went west in hundreds—all in quest of hidden treasure. Ever since then there has been a frequent and spasmodic migration west. In many cases these movements have been perpetuated by the promise of some intangible, though much desired, treasure. And now we find our own folks—hard headed paper makers—crying "Westward Ho!"

There is, however, one little difference between this westward movement of the paper industry and the stampede back in '49. At that time the objective was hidden in a lump of clay, and there were quite a few more lumps of clay than there were lumps of gold. On the other hand, the call of the west to the paper industry is enhanced by vast areas of available pulp wood, sufficient, we are told, for 75 years of intensive manufacture.

As a rule, the manufacturer of today is influenced by tangible assets, and in this latest westward movement, we see no trace of departure from this rule.

So confident are we in the possibilities that the far west will develop into one of the most important pulp and paper producing sections of the continent, that we take off our hats to the men who have the insight and courage to advance the development of this almost-virgin section.

Use Your Condensation to Effect a Big Fuel Saving

Condensation in steam lines is commonly regarded as a waster of fuel and a source of inefficiency in heating and power plants.

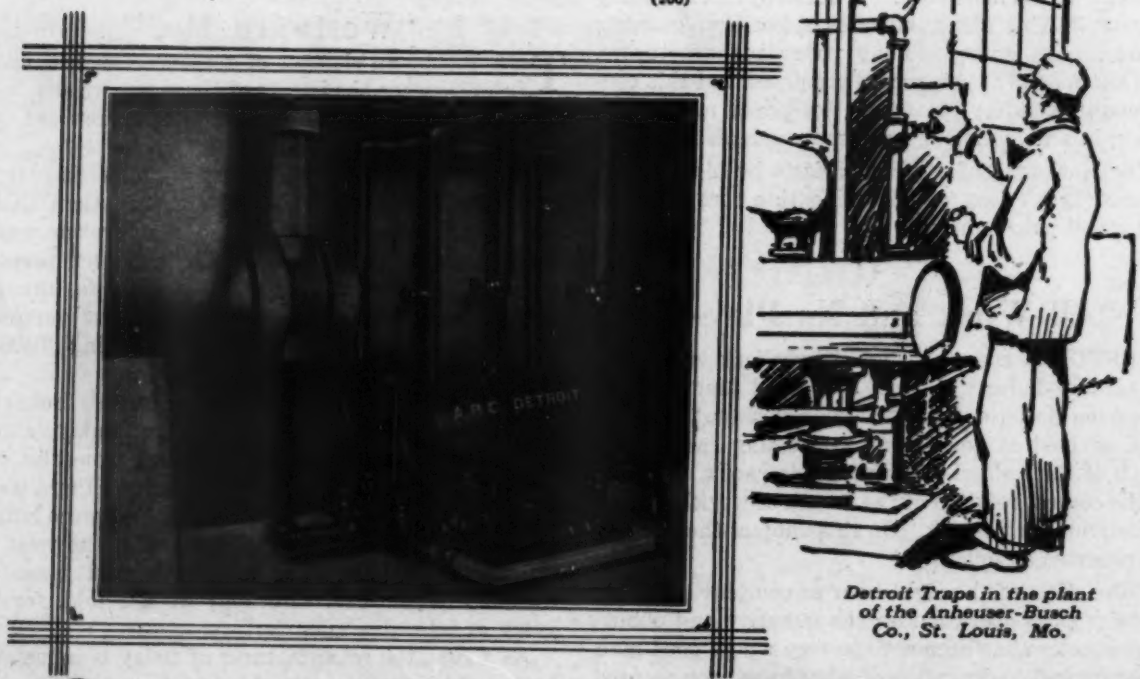
Detroit Steam Traps convert a loss into an asset by draining condensation from the steam lines and utilizing it—*without pumps*—for hot boiler feed.

This condensation—pure distilled water from high or low pressure steam lines—is returned to the boiler without loss of heat. Fuel savings in many cases as high as 15% are noted after Detroit Traps are installed.

We will gladly send bulletins describing Detroit Trap Systems—not only for power and heating plants—but for draining steam heated machines in any branch of industry.

AMERICAN BLOWER COMPANY, DETROIT
BRANCHES IN ALL PRINCIPAL CITIES
CANADIAN SIROCCO COMPANY, LIMITED, WINDSOR, ONTARIO

(260)



Detroit Traps in the plant of the Anheuser-Busch Co., St. Louis, Mo.

American Blower

"Sirocco" TRADE MARK

EXHAUSTERS · VENTILATING FANS · AIR WASHERS · BLOWERS · ENGINES
FOR HEATING, VENTILATING, DRYING, AIR CONDITIONING, MECHANICAL DRAFT

The Forty-Sixth Annual Convention of the American Paper and Pulp Association

Held on April 9, 10, 11 and 12, 1923 at the Waldorf-Astoria Hotel, New York

(By Special Correspondent)

THE annual convention of the American Paper and Pulp Association and affiliated paper industry organizations at the Waldorf-Astoria Hotel, New York, on April 9-12, was the largest attended of any of the forty-five yearly gatherings of paper manufacturers preceding this year's convention. Coming at a time when industrial and economic conditions are such that the individual paper manufacturer was anxious to hold counsel with his fellow manufacturers and obtain their views, individually as well as collectively, on the various problems with which the papermaking industry of the country is faced today, the convention attracted a record number of paper mill executives to New York, and the 1923 gathering will doubtless go down in the annals of the association as the most successful ever held in the almost half-century in which paper manufacturers have been coming to the metropolis of the nation once a year to meet and to confer.

President Henry W. Stokes

This year's convention had a keynote which was sounded at numerous times during the four-day conference. It was CAUTION. Speakers who appeared before the various divisional meetings and before the general meeting of the American Paper and Pulp Association stressed this one thing—caution. The manufacturers themselves urged one another to be cautious. Even the statement on prevailing conditions in the paper industry prepared by the association officers and distributed at the general meeting sounded this note of caution; in fact, this was the gist of the entire statement.

It was the common admission of nearly all those attending the convention that the paper industry is at present in the midst of a prosperous period. Not in a long while has the paper market been so gratifyingly active, nor have mills been called on to work faster to produce all the paper of various kinds wanted by consumers. It was the very fact that the industry is enjoying this degree of activity that impelled the keynote of caution. Paper manufacturers were urged by others and urged by each other to proceed carefully and conservatively in their operations, to produce in a cautious manner, to expand their facilities in a careful and well-thought-out way, and to exert every effort to maintain the stability of their market and to prevent inflation of prices, of production and of labor.

There is no doubt that the spirit of co-operation which prevailed at the convention, that the sincere effort to advise one another of the best methods to pursue during these times of uncertainty, and that the many helpful ideas secured by those attending the convention are going a far way toward maintaining for an indefinite time the healthy and stable condition in which the paper industry is fortunate to be at present.

A new president of the American Paper and Pulp Association was elected at the convention. As is the custom following a tenure of office for two years, Walter J. Raybold, of the B. D. Rising Paper Company, Housatonic, Mass., resigned the presidency after a very successful administration, and the following officers were elected for the ensuing year:

President, Henry W. Stokes, of the York Haven

Picture taken at the Forty-sixth Annual Banquet of the American Paper and Pulp Association, April 12, 1923, at the Waldorf-Astoria Hotel, New York

Paper Company, York Haven, Pennsylvania.

Eastern Vice President, Norman W. Wilson, of the Hammermill Paper Company, Erie, Pa.

Western Vice President, Walter J. Randall, of the Champion Coated Paper Company, Hamilton, O.

For Members of the Executive Committee at Large —Col. W. E. Haskell, of the International Paper Company, New York City; Louis Bloch, of the Crown-Willamette Paper Company, San Francisco, Cal., and L. H. Davey, of W. O. Davey & Sons, Jersey City, N. J.

Thus a man representing the coarse paper branch of the industry assumes the presidency in place of one representing the fine paper branch who has been president for the past two years, while Mr. Wilson, one of the vice presidents, represents the fine paper branch of the industry, and Mr. Randall, the other vice president, represents the book paper branch. The executive committee members at large represent the news print division of the industry (Col. Haskell), the board industry (Mr. Davey), and the third member, Mr. Bloch, was chosen as a representative of the Pacific coast.

A new departure marked the general meeting of the association this year. Instead of the usual annual address of the president which opens the meeting, President Raybold confined his remarks to a few extemporaneous words in which be briefly reviewed the accomplishments of the association during the past year, citing the following in particular as among the things done by the organization: Creating of better relations of the paper manufacturing industry with Washington, good work on the tariff, better trade relations with the National Paper Trade Association, the organization of paper jobbers; increasing the spirit of co-operation among manufacturers and between manufacturers and jobbers, and the clearing of the American Paper and Pulp Association of all debt through the recent taxing of every member $10 as a registration fee, whereupon he announced that he had dispensed with the usual formal president's address and in its place presented a statement on the prevailing conditions in the paper industry prepared by the officers of the association. This statement, which contains many facts and figures of prime interest and importance to the industry, follows in full:

Returning Prosperity in the Paper Industry

Prepared by the Officers of American Paper and Pulp Association

THE revival of prosperity in the general business of the country is gradually being reflected in the paper industry. The paper business was late in feeling the beginning of the depression, and has been late in feeling the full benefits of the improvement in business.

The year 1922 was almost a record year from the standpoint of tonnage of paper produced. Starting with business at nearly low ebb, it was several months before business really began to acquire momentum. The production during the last six months, in spite of low production during the early months, was such as to make the year's total production considerably over any previous record, with the single exception of 1920. The rate of production in the early weeks of 1923 has been at least up to the figures of the latter part of 1922.

The general situation is not free from its dangers, despite the optimism being felt in many large industries. Business conditions have changed rapidly which justifies a belief that present conditions may not be permanent. Every symptom at this time is that the country is at about the same general level as before the inflation of 1920. If the present period of good business is to be followed by a period of inflation, a reaction will be certain.

However, the most conservative economists believe that the country is now upon a basis at which there is no inflation, but a maximum of good business, with employment general at good wages. The increase in costs so far have been in labor and material and not in additional profits to producers. Inflation begins when prices are increased to make unreasonable profits. The bitter experiences of the reaction in 1921 would seem to be too fresh in the minds of manufacturers to make inflation an imminent danger.

And yet, with general business conditions constantly growing brighter, it is a question if the conservatism of the paper industry will serve to hold prices to present levels, because a buyers' market in other lines will still further increase wages and costs of raw materials which will be reflected in a still higher level of costs for manufactured paper. Even the most conservative paper manufacturer cannot continue to sell paper at a loss in a period of generally good business, much as he may wish to do his share to maintain an equable level of general business.

Both raw material and labor have been playing an increasingly important role in the change of the basic conditions affecting the paper industry. Labor costs are rising; in fact, they have nearly reached the highest wage scale ever paid in the paper industry. Raw materials have been increasing in price rapidly.

Paper stock is bringing unprecedently high prices, owing to the shortage of paper, due to failure to accumulate paper stock when markets were low. The high prices are bringing the housewife into the market with waste paper, so that while prices are high there has been paper stock coming forward in sufficient quantities to meet requirements.

The same conditions have prevailed in the rag market. The average man hardly appreciates that the nation's consumption of rags for conversion into fine paper runs into the millions of dollars annually. The census of 1919, for instance, to quote government rather than privately collected figures, shows that

the paper mills of the country in that year paid $24,217,978 for rags, and the waste paper purchased by the industry costs in the neighborhood of $50,000,000 a year.

The result of the high prices in casein is a good example of the situation. Casein is now selling at a price more than double that of a year ago. This increase in the cost of casein means an added cost to the manufacturer for every pound of coated paper produced.

The rise in pulp prices has had its very definite effect on the domestic production of both mechanical and chemical pulps. Bleached sulphite mills are operating at normal capacity production, with unbleached mills at 80 per cent. A comparison of the price quotations for mechanical pulp during 1922 shows that prices rose during the last six months of 1922 to a peak in January of 1923, with the same true in a general degree in bleached sulphite and kraft. Imports of all grades of pulp increased during the year until mid-summer, then fell off for a month or two, but greatly increased again in the latter months of the year.

Pulpwood is now relatively plentiful and at fair prices, as compared with the peak prices of the past. March 1st reports, however, just being compiled, indicate that the mills have faced an average increase of about 10 per cent in the cost of wood for which they have contracted for the next year.

The relation of the strike in the Swedish pulp mills to the American industry is not so serious as many, particularly the importers, have intimated. It has had a decided effect, however, on the American pulp production. As the strike continued, the Swedish exports of pulp practically ceased. The result, however, was not a shortage of pulp as the withdrawal of the import tonnage made it possible for American pulp mills to resume production. The low prices of foreign pulp had caused some of the domestic mills to reduce production. Some domestic manufacturers even found it cheaper to buy imported pulp than to produce pulp in their own plants. The withdrawal of the Swedish supply, due to the strike, has brought domestic pulp into the domestic market once more, at prices which make it possible for the domestic mills to operate.

The latest word from Sweden indicates that the strike is over and that Swedish mills will soon again be in normal operation.

At present, general production of paper is in the neighborhood of 10 to 20 per cent above a reasonable normal for the industry as a whole. Writing paper is only slightly below the general figure for the industry as a whole.

News print in 1922 was only 4 per cent below the previous high record of 1920, but including Canada, all records for America were exceeded.

In wrapping and tissue, even the 1920 record was outstripped by the production of 1922.

With the rapid change of conditions in general business, the paper industry is suffering more than some other industries from the effects of rising costs. Costs have risen faster than prices of the manufactured product. Every possible effort is being made by paper manufacturers to keep costs down, but this increase is largely beyond their control.

The historic conservatism of paper manufacturers and their determination to avoid even a semblance of inflation will prevent any attempt to take advantage of the rising tide of business to radically increase prices. It is because of the belief that such increases, if followed in all basic industries, would be harmful to general business, rather than beneficial, that the prices have remained so far at reasonable levels.

This review of the situation indicates the necessity, considering the state of general business, for the paper industry as a whole to keep its head in good times as well as it did in bad. A real conservatism should and will be exercised. If this course is followed by the leaders of business and labor it is fair to assume that business will continue good for months to come, if not for the entire year. The officers of the American Paper & Pulp Association sincerely hope that this will be the case.

Report of Secretary

Dr. Hugh P. Baker, treasurer, then submitted his report, showing that the income of the association from all sources during the fiscal year ended March 31, 1923, totaled $50,963, and that disbursements amounted to $50,624, leaving a balance as of April 1, 1923, of $339 but with the association having no debts of any kind.

Dr. Baker submitted his annual report as executive secretary, which appears on page 165 of this issue.

President Raybold then introduced Dr. B. M. Anderson, Jr., economist of the Chase National Bank of New York, who gave a highly interesting and instructive discourse on general business conditions from the economist's viewpoint. Dr. Anderson stated that the present business boom, which started about October 1 last, was healthy in character, and that there were numerous favorable indications that it would continue for sometime to come, but he sounded a note of warning against undue expansion of production or manufacturing facilities, pointing out that the world's business balance at this time is very uneven since there is a danger of over-production of manufactures and an insufficient market to absorb these manufactured products.

He touched at considerable length on the plight of the American farmer today, saying that whereas the farmer is receiving less than 10 per cent more for his wheat, corn, oats, hogs and other products than he received prior to the war, he is compelled to pay an average of 70 per cent in excess of pre-war prices for everything he buys for his own consumption. He emphasized that this made for an unbalanced economic situation which might at any time

assert itself in creating a repetition of the business conditions of 1921 and early 1922. He also spoke of the European problem, calling the industrial and financial position of Europe the "skeleton at the feast" of American business interests who are enjoying a revival of industrial activity.

Dr. Anderson predicted a broad movement of business activity during the next few years, stating his belief that until the world finds itself and restores its pre-war stabilizing balance, commodity prices would fluctuate on a wide scale and industrial activity would move in periodical cycles.

Following Dr. Anderson, E. W. McCullough, manager of the Fabricated Production Department of the Chamber of Commerce of the United States, spoke on the subject of "Trade Associations in Industrial Progress." Mr. McCullough's address will be published in a later issue. (Com. Reports on Page 189.)

Solution of Intricate Transmission Problem in Paper Mill

By K. W. KNORR, M. E.

ONE of the things which must be provided in a paper mill power system—a thing which is of prime importance, for without it the modern mill cannot successfully or efficiently function—is a means of varying the speed of the unit which drives the paper machine.

There are on the market standard devices known as variable speed units which are well designed from a mechanical standpoint, efficient in operation and easy to handle, and practically every paper mill has one or more of them in constant use. However, the ranges of speeds which these devices can give are necessarily more or less limited, and then too there is a limit to the amount of power which can be successfully and efficiently handled by them.

Vary Main Jack Shaft Also

Consequently, while these variable speed units are generally essential in all installations to secure the closer variations in the speeds of the various secondary driving countershafts, it is often necessary to effect the larger speed variations by changing the speed of the main jack shaft.

In installations where these requirements occur, the machines are usually of such size that separate power units are provided for them so that it has become quite common practice to accomplish the major speed variations by varying the speed of the prime mover.

If the driving unit is a variable speed motor, the speed change is effected by changing the controls which are an essential part of the unit. If it is a variable speed engine the change is accomplished by means provided by the engine builder. Sometimes the engine is not of the variable speed type and is consequently not provided with special speed changing controls, so the changes are provided for by having a set of governor pulleys of various diameters, each of which by its control of the governor will give the engine a different speed.

Securing Still Wider Range

But there are limits on the variations which the altering of the speeds of the prime movers can give and once in a while it is desirable to go beyond these limits to give a wider range of adaptability to the machines to which the power is finally delivered.

In cases of this kind the units are usually very large ones so that the amounts of power to be handled are of no inconsiderable size and consequently the problem of increasing the range of the stepping of the speeds sometimes becomes one which is not easy of solution.

A situation of this kind was very recently met in one of the largest mills in the country, where the requirements were such that to operate at the highest efficiency and at the same time secure the greatest possible output on their machine they had to deliver 300 hp. to their main jack shaft, and at the same time give this jack shaft a variation in speed of from 252 down to 90 r.p.m.

They had a variable speed engine, with a speed range of from 112 down to 80 r.p.m. and fitted with a 12-ft. flywheel grooved for 20 ropes 1½ ins. in diameter. The amount of space available for the installation was very limited in the direction at right angles to the engine and jack shafts, being only about enough to satisfactorily accommodate the drive connecting the two, but a limited amount of space could be arranged to permit extending the jack shaft.

How Problem Was Solved

The combination of a power requirement of this magnitude with the wide speed range necessary and the limitations as to space, together with the obvious necessity of having whatever was installed so arranged that it would be not only extremely flexible in its operation but also involve a minimum of moving parts to use up power, it will be readily seen made

*Reprinted from the March Issue of "Belting Transmission Tools & Supplies."

a very perplexing problem. The drawing shows the arrangement which seemed to best cover all of the requirements.

Had it not been for the limitations in space available for the whole installation, belts or ropes could have been used, but the large diameter wheels which would have been needed in order to make efficient drives could not be accommodated, so in order to minimize as much as possible on space and at the same time maintain a maximum of efficiency in the drives, herringbone gears made of steel were specified, and by this means the distance between the centers of the shafts was kept down to only 5 ft.

How Quills Were Used

Elimination of the driving of parts not doing any work was accomplished by liberal use of quills, which are nothing more than hollow shafts bored enough larger than the shafts going through them to insure no contact at all between the quills and the shafts. Each quill is carried independently in its own bearings and is flanged on one end to match a half coupling keyed to the shaft and is mounted with just enough distance between the two mating flanges to permit independent motion when the flanges are not bolted together.

Extreme Flexibility Possible

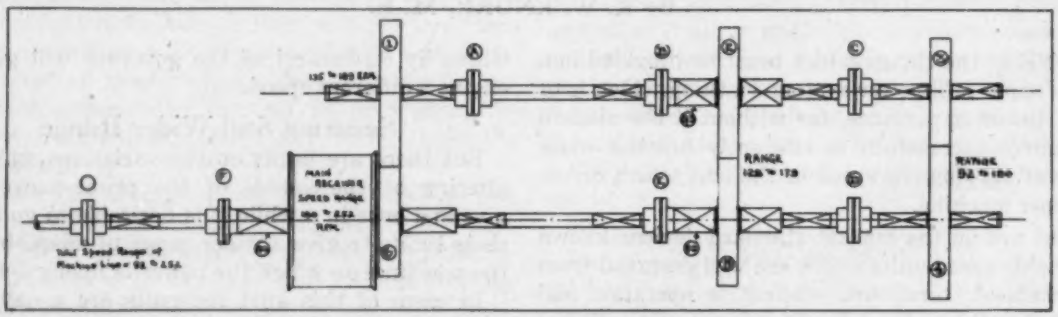
This permits either one to revolve while the other stands still, or one can run at one speed and the other at another, both of which conditions exist in this particular installation. When it is desired to fasten two mating flanges together the space between them is filled with a distance plate and then they are all bolted together.

This method makes it possible to connect or disconnect any unit or combination of units, and while friction clutches in place of these flange connections would make the changing of the speeds a much quicker and easier operation, in this installation the changes do not have to be made while the outfit is in operation, and when once made they usually stand for a comparatively long period of time. So the investment which the friction clutches would involve was not considered as justified by the requirements.

It will be noted that the sheave taking power from the engine is mounted on a quill, and besides it is also mounted gear No. 6. This receiving sheave being 64 ins. in diameter is driven at speeds ranging from 180 to 252 r.p.m. as the speed of the engine is varied through the range of from 80 to 112 r.p.m. Consequently, when this range of speed suffices, the quill is bolted to its mating flange, and the jackshaft then revolves with the quill. Of course, when hooked up in this way all other couplings in the outfit are disconnected, and while gear No. 6 drives gear No. 1, as it is impossible to disengage these two, all of the other parts remain at a standstill.

Function of Flanges

With flange F disengaged and flanges A, B and E hooked up, gear No. 6 drives gear No. 1 through a range of speeds from 135 to 189, and gear No. 2 being tied up with the line carrying gear No. 1 and running at the same speeds, drives gear No. 5 through a range of from 128 to 179 r.p.m. Gear No. 5 being hooked up to the machine drive shaft gives it this same variation in speeds.



Solution of transmission problem on paper machine

The third combination leaves flanges B and E and F uncoupled and all of the others bolted up, and gear No. 3 drives gear No. 4; and consequently the machine drive shaft through a speed range of from 92 to 180.

In this last hook-up, quills Nos. 2 and 5 stand still and while the shafts run there is no power loss as there is no contact between them. Quill No. 1 runs at one speed, while the shaft running through it goes at another.

While this layout was made to meet a specific condition, the principles involved offer simple solutions to many transmission problems which at first blush seem very much involved.

In an article recently translated from a German paper for use in THE PAPER INDUSTRY, there is given "Seven Ways to Use Corn Starch." In going over these seven ways we discover that perhaps the most important way to use corn starch has been omitted, so let us add an eighth, namely **pudding.**

The Fourdrinier Machine

By HARRY E. WESTON
Instructor in Pulp and Paper Manufacture, The New York State College of Forestry, Syracuse, N. Y.

This is the fifth installment of the article on the Fourdrinier machine in preparation by the author. Further installments will appear in succeeding issues.
—Editor.

Calenders

FROM the dryers, the paper goes to the calenders which are simply upright stacks of highly polished steel rolls. The word cylinder is derived from calendra (a corruption of cylindrus, a roller or cylinder). These calenders are used for giving a smooth and even surface to the paper. The number of rolls in a stack depends upon the desired finish for the sheet. There are generally from 7 to 11 in a stack, the whole stack being driven by the friction of the bottom roll. Sometimes two or even three stacks are used between the dry end of the machine and the rear.

The manufacture of calender rolls demands great care. Reason for freak troubles encountered in their manufacture oftentimes cannot be given. The rolls are cast and chilled and must be of fine grain and free from blemishes of any kind. The question of shrink-

(Continued on next page)

Suggestions for the Care of Paper Cutter Knives

THERE seems to be a great lack of understanding among mill men as to the proper method of grinding machine knives so as to keep them in the best condition. The Seybold Machine Co., Dayton, Ohio, has prepared a sheet of instructions on this subject. Feeling that this will be helpful in most mills, we herewith publish most of these suggestions.

Grinding

The utmost care and judgment should be used in grinding paper knives, whether ground with a sandstone or an emery wheel.

If an emery or any abrasive wheel is used it should be made by silicate process about 66/36 grain, medium grade, or soft enough so that a light feed can be taken without burning or glazing the bevel of the knife.

The operator of the grinding machine should be in constant attendance while the knife is ground, and should have a liberal supply of water feeding on the wheel where it comes in contact with the bevel of the knife—not at the top of the wheel. If this supply of water is cut off from any cause, and the wheel continues to grind without water, it will create a friction, heat up and draw the temper in the knife or crack the knife.

Extra precaution should be taken to grind the cutting edge of the knife parallel with the top of the knife, not either end or the center of the knife wider than another part, for when this occurs the cutting edge of the knife does not strike the cutting stick squarely. It has a tendency to snip out at the wide section and also destroys the cutting stick quickly.

The bevel should be ground flat or a shade concave, and must not exceed in length twice the thickness of the knife plus one-quarter inch, or twenty-four degrees. If this rule is not adhered to and a longer bevel than this is ground on the knife, the flat side or face of the knife will become rounded about one-half inch back from the cutting edge, thereby taking the slight concave out of the knife and causing the machine to cut tapering, i. e., the top of a cut, say four or five inches high, will be narrower than the bottom of the cut.

If any color shows on either the face or back of knife when ground, it indicates that the temper has been drawn by overheating caused from lack of water, too heavy feed or an improper or glazed wheel.

Honing

Every knife, when coming direct from grinding machine, has a wire edge, which should be honed off before the knife is placed in the knife-bar.

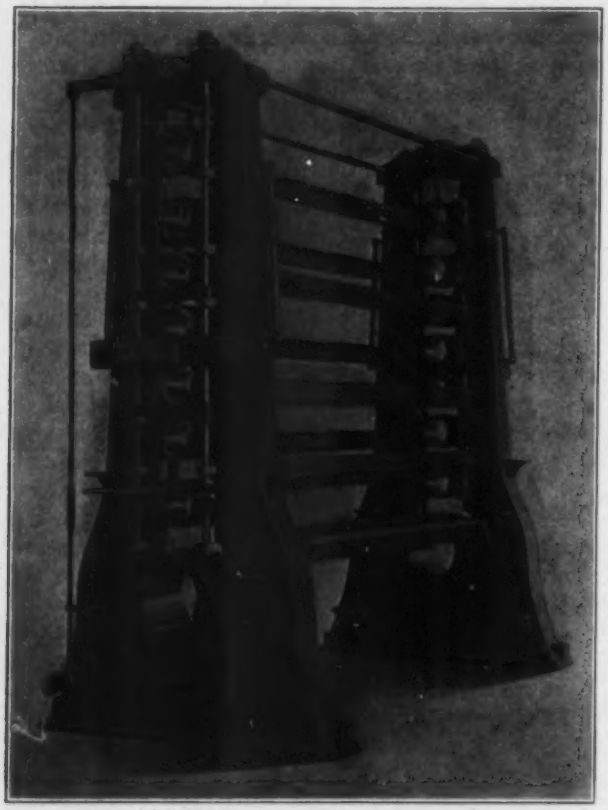
The knife should be laid on a bench or table, flat side down, with the edge of the knife protruding about one-eighth of an inch beyond the edge of the table. The hone should be held flat on the bevel and the motion should be circular or rotary movement as well as up and down. The honing should be done from one end to the other without lifting the hone from the knife.

Never hone the flat side of the knife to sharpen it. When a fine wire edge appears on the flat side, lay the hone on lightly with no pressure and absolutely flat, and draw from one end to the other. After honing the knife for a short time (four or five minutes), the wire edge will disappear or get so thin that a small piece of white pine or other soft wood drawn along the cutting edge will eliminate this wire edge.

Never hone a knife while in the machine.

We recently had occasion to purchase a short manuscript from a writer in Germany. In payment of these few lines the author received 16,500 marks. Sounds like a hold-up. As a matter of fact, however, this bale of marks is but the equivalent of $3.20 in good, old, United States money.

age is very important, owing to the fact that the shrinkage of chilled iron is many times greater than that of soft iron. A slight difference in temperature, a difference of only a few degrees, makes all the

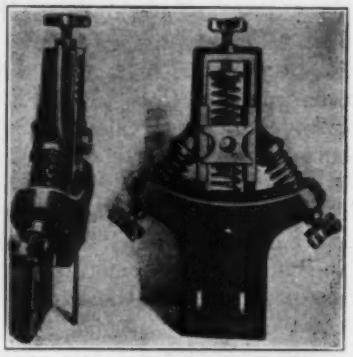


Courtesy—Downingtown Manufacturing Co.
Construction of calender—Rolls have not yet been placed

difference between a good and a bad roll. The iron used in their manufacture is usually bought on analysis and reanalyzed in the manufacturers' laboratories. The mixture and quality of the iron determines the depth of chill, and the depth of chill is determined largely by the size of the roll and the class of work in which it is used. The size of the calender rolls depends generally upon the width of the machine.

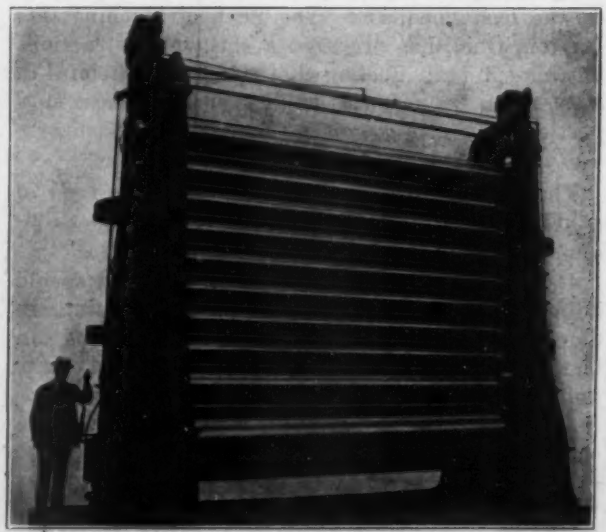
Experimental calenders with rolls usually 6 inches in diameter, and a 30 or 40 inch face have been made. Large news calender rolls are usually 14 inches in diameter for the intermediates, 20 inch top and next bottom, and a 30 inch or 32 inch bottom roll with a face of 190 inches to 200. A calender with a working face of 226 inches made up of two 20 inch, seven 14 inch and a 32 inch bottom roll can be considered a large unit. The weight of such a stack, including the housings in which the rolls run, but without the doctors or drive, is approximately 206,000 pounds, or more than 100 tons net. The grinding and crowning of these rolls is of utmost importance. If all the rolls were ground straight in such a stack the bottom roll would be open, that is, would show light almost from end to end, and it would be impossible to make a perfect sheet of paper. It is essential that a sheet of paper be of uniform thickness. Therefore the proper crown must be put upon the bottom roll so that this roll may carry the weight of all the rolls above, and likewise calender a sheet which will be even from edge to edge.

The paper enters at the top of the stack, being carried across from the dryers and under a spring roll. Any tension due to uneven pull between the dryers and the calender stack is absorbed by this spring roll. Rolls must always be kept in alignment. Foundations of concrete or rock are required. Friction rings are provided to take care of the ordinary endwise crowding. Sometimes excessive endwise crowding is caused by a worn journal box, or the unequal pressing of levers on a stack equipped with compound weighted levers. Ball bearings are now used by some manufacturers to insure greater accuracy and to save power. In stacks where great pressure is applied, it is necessary to slightly crown each roll according to the weight being carried.



Courtesy—Dilts Machine Works, Inc.
Yielding brackets for tension rolls

Lint, dirt, specks, etc. are removed from the rolls by means of thin steel blades known as "doctors" which are pressed against the calender rolls by means of springs and thus aid in preventing scabs (any foreign material impressed upon the sheet). There is one doctor for each roll. The edge of the doctor is



Courtesy—Farrel Foundry & Machine Co.
Calender Stack

beveled so as to cause as little friction as possible and at the same time to prevent scratching or scoring of the roll. The doctors prevent the paper from running around a roll when it is being put through the stack. It is necessary that each stack be provided with equipment for lifting the rolls. This equipment is ordinarily of either the hydraulic type or of the threaded lift type operated by a handwheel. These lifting devices are made to raise any number of the rolls in the stack.

Reels

The sheet of paper, representing the completion of many expensive operations, is now ready to be reeled. Naturally this operation should be as efficient as possible so as to reduce waste to a minimum.

Three different types of reels are in common use. They may be designated as Stack Reels, Revolving Reels, and Drum Reels.

Stack reels are built with one reel placed above another in frames so arranged and constructed that the reels can be easily removed for the rewinding operation after they have been filled. After reels are removed from the stacks, they are placed on a separate set of stands for rewinding the paper into smaller rolls or for cutting off into sheets.

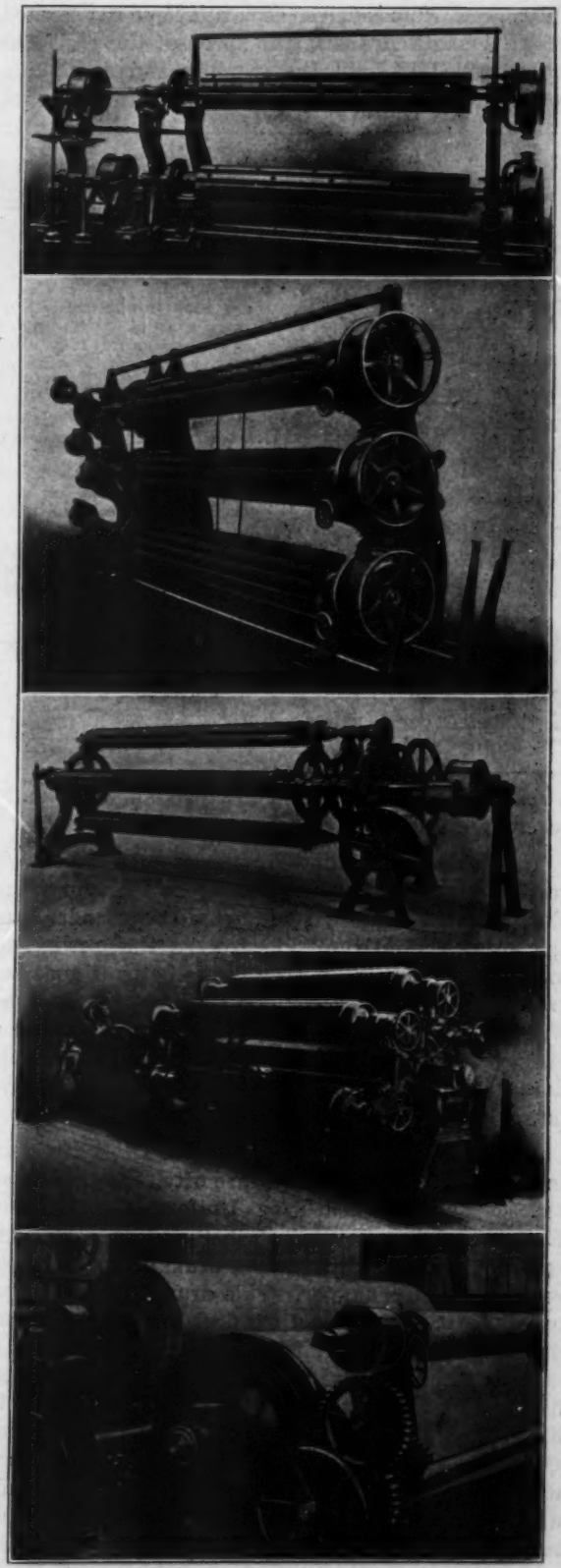
The number of reels in a stack may vary. Two and three-reel stacks are in common use.

Stack reels are commonly driven by means of belts or gears. In any case it is essential that the speed of the reel be controlled in winding and unwinding. Care must be exercised in winding so as not to break the paper and in unwinding so that the paper is not allowed to become slack. The paper will become slack if the reel is unwinding too rapidly.

This type of reel, in the case of high speed machines, is extremely dangerous to operators. The danger lies in allowing one reel to be winding up while another reel in the same stack is unwinding. It is for this reason that a reel, when filled with paper is removed from the stack for unwinding. However, if this arrangement is not possible, the operation of the reels may be made safe by changing the direction of rotation of one reel in a two or three-reel stack. This change of direction is accomplished by crossing the belt of one reel (if belt driven), or by introducing an idler gear (if gear driven). Such an arrangement eliminates the nip and removes the hazard of operator being caught on the nip side and drawn between the rolls.

Revolving reels consist of a set of reels arranged in the form of a cylinder, and are so constructed that by the time one of the reels is filled another is in position to take its place. Likewise, by the time the full reel is almost unwound, another full reel is in position for unwinding.

The number of reels in a revolving reel, as in the case of stack reels, may also vary. Two, four or six reels are commonly used in this type of equipment.



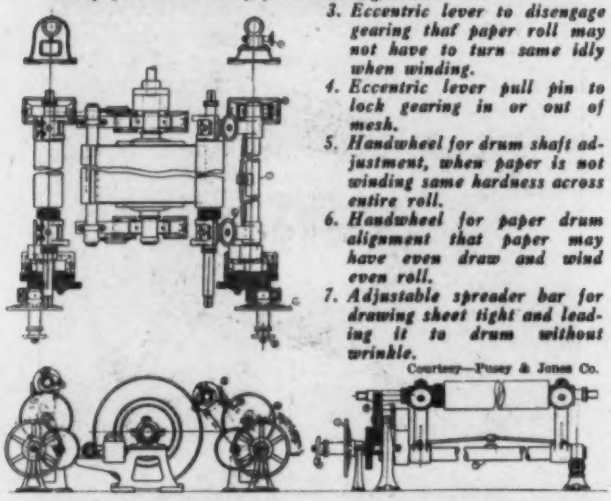
Nos. 1, 2, 3 and 4, courtesy—Pusey & Jones Co.; No. 5, the Bagley & Sewell Co.

1—Two-drum upright reel. 2—Three-drum upright reel. 3—Four-drum revolving reel. 4—Six-drum revolving reel. 5—English type uniform speed reel in operation

Each reel drum is driven separately and so operated by friction clutches that the speed of the reels can be controlled in both the winding and unwinding operations. The whole reel frame also rotates so that a reel is always in position to receive or is actually receiving paper as it comes from the calenders.

Uniform Speed Reel—English Type

1. Handwheel for raising or lowering paper drum against 42" winding drum. Note direction of rotation.
2. Handwheel for control of ratchet to lock gearing and arms to hold paper drums away from winding drum.
3. Eccentric lever to disengage gearing that paper roll may not have to turn same idly when winding.
4. Eccentric lever pull pin to lock gearing in or out of mesh.
5. Handwheel for drum shaft adjustment, when paper is not winding same hardness across entire roll.
6. Handwheel for paper drum alignment that paper may have even draw and wind even roll.
7. Adjustable spreader bar for drawing sheet tight and leading it to drum without wrinkle.



Courtesy—Pusey & Jones Co.

The danger so common in the operation of stack reels is eliminated by the use of the revolving reel, since one reel is on the side toward the calender, and the other is on the side toward the rewinding machine. However, an operator sometimes goes between the stationary part of the machine and the winding reel to smooth out the paper. Such practice should be prohibited because there is considerable danger of loose clothing being caught on the revolving rolls.

The Drum Reels or Uniform Speed Reels are coming into common use. They are often referred to as the so-called English Type Uniform Speed Drum Reels. These reels are especially adapted to high speed machines. The winding drum of one of these reels is 42" in diameter. This drum is so arranged with the paper drums that first one of the paper drums is revolved with its increasing load or is reeled until full of paper and then the other reel is filled in like manner. In the meantime, the full drum is lifted out of its bearings on the ends of the swinging arms and is carried over to the unwinding stand from which the paper is unwound to the slitter and rewinder. Each reel is equipped with wide friction retarding pulleys for unwinding so that the speed of unwinding may be under control of the operator.

The cut indicates very clearly the operation of one of these Uniform Speed Reels.

Winder (Slitter and Rewinder)

The paper must now be cut into the desired widths and made into rolls. The jumbo roll as formed on the reel is slit and rewound on the slitter and rewinder. The slitting and rewinding operations are integral, and it is necessary always to consider one in relation to the other. The rolls must be rewound absolutely straight so that the paper will advance uniformly from the jumbo roll. The paper must be held rigidly, and must be properly calendered so that a uniform surface, which is a requisite in good winding, will be presented.

Two types of slitting and rewinding machines are in general use. The first type of machine operates by what is known as the center rewind method. It is the older method of the two, and is based upon the use of multiple mandrels upon which the paper is threaded. These shafts are commonly driven from one end by a friction drive. The hardness of the rewound roll depends entirely on the amount of tension applied to the paper. This tension must necessarily be limited by the strength of the paper and the width of the rewound rolls. The coils formed on these separate shafts are never precisely the same diameter owing to slight variations in the thickness of the material and the variation in speed of the various mandrels caused by the friction drive. The speed of travel of the web often begins very slowly and builds up to a racing speed at the end. Due to these various difficulties, this type of equipment is being manufactured for use in rewinding smaller sized rolls, usually not over 25 inches in diameter. It is used principally by manufacturers of paper products which require a simple, inexpensive machine.

The second method is known as the surface rewind method. It consists of a single shaft on which rolls are formed side by side coming in contact with

Courtesy—The Cameron Machine Co.

a pair of revolving support rolls which bear the rolls. Power is not applied directly to the rewind shaft. This method is generally believed to be the best method of rewinding. If the installation has been properly designed, and it is accompanied with the right type of slitting device, it is far superior to the old center rewind method. The speed is under control at all times and the roll can easily be made any degree of hardness or softness.

As the slitting process and rewinding process cannot be considered as distinct and separate operations, it is advisable that the two operations work co-ordinately. There are two common methods of cutting a web of paper into strips.

1. The Shear Cut method.
2. The "Score Cut" method.

The Shear Cut method has been very widely used and was at one time considered as the last word on the subject of slitting. This method consists simply of circular discs arranged in pairs and having sharp edges which are slightly overlapped. The method is also known as the "Circular Shears" method. A sharp cutting edge is necessary for doing good work. The edges are bound to become dulled slightly, even after moderate use. It is difficult to resharpen a dulled edge and a dull tool will do poor work. The strips produced with a dull "Shear Cut" slitter are apt to be stretched and frayed. This stretching and fraying on the edges of the strip cause the rolls to cling together. In some cases, it is nearly impossible to separate the rolls from each other when they become meshed together in this manner.

On account of the many difficulties in maintaining production and high class finishing with the rotary shears, "score cutters" have come into use. Roll winding in one of the machines of this type is accomplished by means of two supporting drums supplemented by a riding or pressure roller which rides on the top surface of the rolls of paper as they are being formed. The slitting is done directly against the foremost of the two supporting drums, as the paper passes to the winder. The surface of the drum, which is flint hard and highly polished, consists of several long tubular sleeve sections fitting end to end on a core shaft. Such a hard surface resists the action of the cutter wheels.

A special system is used on machines of this type operating on paper 90 or more inches in width. In this case, the slitting operation is performed on a separate roller, placed below the front supporting drum since it is uneconomical to manufacture a drum of sufficient size with the specially hardened surface.

This same machine is also provided with a system of grooving, running spirally or angularly around the face of the front drum. Because of its special construction, such a drum absorbs draw wrinkles which so frequently occur in working on wide webs. Elimination of the draw wrinkles permits the ready separation of the finished rolls.

The score cutters in either case consist of cutting discs of special steel with slightly blunt or V-shaped edges. They are mounted on ball bearing centers and revolve under spring pressure in contact with the surface of the material to be slit. The spring pressure

Courtesy—Fusey & Jones Co.

Slitter combined with a two-drum uniform speed winder for the trimming, slitting, and winding of newsprint paper into shipping rolls

forces the edge of the cutters through the paper against the very hard-surfaced backing roll.

The problem of maintaining satisfactory edges on score cutters is not as troublesome as in the case of rotary slitters because the score cutter does not depend for its action on a sharp cutting blade.

After the rolls have been cut to the proper size, and the plugs inserted, they are ready for the final stage of finishing. In this stage the paper is wrapped either mechanically or by hand. Mechanical methods of wrapping are commonly employed in the large, modern finishing plants.

How About Your Lights?

In one paper mill it was found that it would be necessary to add considerably to the lighting equipment, as that which was being used was inadequate. A so-called expert was called in. This man was not only an expert, but he had a good eye and a lot of good common sense.

The expert started in one particularly bad, though small place. The first thing he did was to call for some one to wash the lighting equipment, which seemingly had not been done for years. He then ordered the walls washed, which had at one time been white, but were now dark and dingy.

After he had finished with this department he called the manager of the plant to see the change. The latter was startled at the transformation. The expert said: "With a few exceptions you do not need any additional lights. What you do need, however, is to have your lighting equipment kept in proper shape." This might apply to other things than lights around many paper mills.

The Lubrication Engineer

By H. A. BUZBY

President of Keystone Lubricating Company

ONLY in the last quarter century has lubrication come to be recognized as an important economic factor in production. Before that, it was just a necessary evil, probably fully as evil as it was necessary. For the engineer of those days simply bought oil or grease, with little regard as to whether or not it was suited to the proposed use. And even today, that condition still exists in some plants.

But as industry as a whole has progressed under the pressure of competitive conditions, the demand for greater efficiency and economy in lubrication has become more and more insistent. New and heavier types of machinery which operate at higher speeds under greater friction loads were developed. With these came the need for a more efficient lubricant and with it, the lubricant engineer.

Thus a new profession has come into existence. Different plants all operating under different conditions with different types of machinery must be diagnosed and prescribed for by the lubrication engineer just as a patient is treated by a doctor.

The study of scientific plant operation has given the lubrication engineer a real knowledge of the importance of proper lubrication. A leading authority estimates that the average loss by friction is 50 per cent of the power developed. However, in most instances this loss has been considered unavoidable and its real significance was not realized.

So long as the plant was running without shutdown it was presumed that there was no serious cause for complaint. Little consideration was given to the fact that even though bearings do not become so warm as to necessitate shut-down, the excessive friction may be causing extraordinary depreciation in machinery and often an even greater loss in decreased production. This condition was not due altogether to neglect, but was the natural result of long use of inferior lubricants, and the fallacious belief that not much better result could be obtained under any condition.

Within comparatively few years, various industries have developed types of machines which are operated under abnormal heat conditions. Such as trunnion bearings of kiln, tube or ball mills, calendar bearings in paper mills, rubber mills, etc.

Many products have been offered for the lubrication of these types of bearings which cannot be truly classified as lubricants, because they contain artificial, non-lubrication, bulk-building, friction-producing materials.

Only recently a pure grease has been developed, scientifically manufactured from high grade petroleum oils which contains none of the non-lubricating ingredients referred to. This grease is a remarkable step forward in the development of efficient lubrication of machinery operating under high radiated heat conditions. It is a pure petroleum grease that combines all the necessary heat resisting properties with high lubricating value and efficiency.

The use of this new formula under the severest working conditions of heat has not resulted in decomposition or waste, but on the contrary the grease has held in bearings where other lubricants have given little or no satisfaction.

Paper Machines Present Problem

In the development of mechanical units in the various industries, there has probably been no more tedious problem presented to the lubrication engineer than that of providing satisfactory lubrication for paper mill machinery. In this class of work, lubricants have not only to contend with heavy bearing pressure and the consequent tendency to overheating due to friction, but with the heat transmitted to the bearings by the steam that is a necessary adjunct in the proper manufacture and finish of paper of various grades. In consequence of this added heat condition lubricating oils and some greases have proven woefully deficient. The added heat contributed to lost lubricating value, rendering them totally inefficient to withstand the heavy bearing pressures imposed upon them and causing them to assume fluid condition. The natural result has been increased wear and tear of the bearings, and an increase of objectional accumulations around the machines.

Various greases have been manufactured to take the place of oils on both calender and finish rolls, but these greases, in order to withstand the heated conditions, have been invariably of the soluble soap type, containing a large percentage of free alkali. Most of these lubricants would prove more effective for cleansing purposes than for use on high-class machinery bearings. In addition to these shortcomings which exist, the character of these lubricants gives them a tendency to excessively increase friction rather than to decrease it.

The Purpose of a Lubricant

The purpose of a lubricant is to cling to the bearing surface at all times — to reduce friction by forming a cushion between the metal parts, preventing wear and tear. A grease that is affected by heat will melt and run out of the bearings. Any grease that melts and runs away is not a lubricant—it's just grease.

The use of oil is attended by many disadvantages.

chief of which is its inclination to shirk its work. The fluidity which permits the oil to flow so readily into the bearing causes it also to flow out as soon as the bearing surfaces are put in motion. This feature is particularly disadvantageous on line shafting. The oil will not only leave the bearing quickly, but is prone to drip and fly from the revolving shaft and spatter the walls, ceiling and stock; increasing the fire risk and damaging goods in process of manufacture.

Unless it receives constant attention, oil lubrication results in dry bearings, which in turn cause excessive friction, scored bearings and broken shafts, and not infrequently complete shut-downs.

It is necessary to use a large quantity of oil to get a relatively small amount of lubrication.

Oil lubrication is, therefore, expensive. The loss through wasted oil and cost of labor required in attention to lubrication is great, but the cost of power necessary to carry the friction load and the cost of repairs are very much greater.

As the demand for efficiency became more and more insistent it was apparent to all that a more efficient lubricant was necessary for use on the great majority of machinery. It was realized that a heavier-than-oil lubricant was essential to improved lubrication. Once this need was apparent there was a general casting about for something with all of the lubricating qualities of the best oil, but with none of its disadvantages.

The result was lubricating greases, many of which were originally (and still are) but little more than soft soap with a "filler," weight-making non-lubricating, to give them body.

The nature of this "filler" varies according to the theory of the maker. It may be wax, paraffin, resin, resinous oil, talc, clay, graphite or some other substance equally worthless for the lubrication of machinery, and in most cases positively injurious to the bearings to which it is applied. Not one of these materials will add in the slightest degree to the lubricating efficiency, but on the contrary will materially increase the friction load on every bearing on which it may be used. Many greases are made wholly or partly from animal oils which decompose or become rancid and may be very offensive when kept in a hot engine room. Such greases are generally highly scented to disguise the odor rising from this cause. Oil of myrbane, which smells like "almond oil" and oil of citronella are extensively used for this purpose. The failure of such mixtures to give efficient lubrication, and their tendency to increase rather than decrease bearing troubles, have naturally prejudiced many engineers against the use of grease. With a scientifically manufactured pure petroleum grease, however, its efficiency under all working conditions the year round has been so thoroughly demonstrated that it is now generally recognized by consulting and practical lubrication engineers as the ideal lubricant for practically all purposes.

Paper and Pulp Plants Better 1921 Accident Records

By J. M. SANDEL

Safety Engineer, National Safety Council

FIFTY-FIVE members of the Paper and Pulp Section of the National Safety Council with nearly a hundred million hours spent on production—an increase of thirty million over the previous year—turned in a cumulative accident experience for 1922 better than that of 1921. The average accident severity rate in 1922 was 2.56, as compared with 2.83 in 1921.

For the last three years, each member of the Paper and Pulp Section of the National Safety Council has been requested by the chairman of the section to send their accident record for the year for publication. The final result is an arrangement in the form of a table as shown herewith. The companies are identified by a key number, which is known only to the company itself and one member of the staff of the National Safety Council. In this way, confidential information is available without embarrassment to anyone.

The members are arranged in order of the severity rates for the year 1922. In accident statistical work, the severity rate is the governing factor in determining a good rate. Low frequency rates are desirable, but they are not to be especially striven for. To obtain a low frequency rate requires the reporting of as few accidents as possible. If this is done, men will not go to the doctor's office for first aid treatment, something that they should always be encouraged to do. Slight injuries should be reported in order to avoid resulting infections and other serious injuries.

Companies of all sizes contributed their experience. The size of a plant and organization can be judged by the average number of employees. For example, companies Nos. 6, 54, 5, 76, 20, 12 and 17 are almost the same size, but company No. 6 made the best record and company No. 17 the poorest record of that group.

Company No. 71, which led the list, did not have a lost-time accident during the entire year. They experienced only one accident, but the injured man did not lose even the balance of the shift. This is a very good showing indeed. In the first ten companies are

1922 Standing	1921 Standing	1920 Standing	Co. Key Number	Average Number of Employes	1922 No. of Hours Worked	No. of Accidents	No. of Days Lost	Frequency Rate	Severity Rate	No. of Deaths	No. of Permanent Injuries	1921 Frequency Rate	1921 Severity Rate	1920 Frequency Rate	1920 Severity Rate
1	....	....	71	35	91.000	0	0	0	0.	0	0				
2	....	....	70	99	207,504	3	12	14.44	.058	0	0				
3	1	5	2	87	325.728	11	34	36.66	.104	0	0	5.5	.054	22.9	.206
4	....	....	73	100	280,000	4	31	14.28	.112	0	0				
5	....	....	78	2,856	6,652,094	61	911.5	9.24	.137	0	0				
6	....	7	25	448	1,164,800	25	185	22.73	.159	0	0			26.0	.25
7	....	....	74	40	98,800	2	17	22.20	.173	0	0				
8	26	26	26	135	502.584	9	11	18.00	.221	0	0	26.0	.906	32.4	2.14
9	42	....	49	1,868	4,366,112	154	1,153	35.81	.261	0	⅜ finger	31.4	2.69		
10	22	....	57	700	1,747,200	549	450	322,94	.263	0	0	15.3	.755		
11	10	6	6	275	707,050	14	232	19.8	.326	0	0	22.3	.38	35.3	.24
11	4	14	30	40	129,480	5	42	41.66	.326	0	0	12.5	.175	46.0	.611
13	2	3	44	380	810,160	147	265	181.48	.327	0	0	4.7	.06	11.9	.16
13	41	....	50	1,009	2,500,090	64	819	25.6	.327	0	0	26.0	2.28		
15	....	8	34	470	1,229.508	53	474	44.17	.385	0	0			49.9	.29
16	17	....	48	250	626,914	15	255	25.00	.407	0	0	42.5	.66		
17	6	....	63	212	531,075	19	218	35.77	.410	0	0	46.6	.31		
18	46	....	54	300	810,000	34	355	42.50	.438	0	0	35.8	3.97		
19	27	25	27	294	818,103	34	370	42.50	.452	0	0	56.98	.953	52.1	1.90
19	48	....	66	834	2,242,637	65	1,014	29.40	.452	0	0	25.1	6.25		
21	49	32	15	1,200	2,697,471	141	1,810	39.16	.489	0	1 thumb	18.2	6.5	24.9	3.62
22	7	39	1	120	345,725	20	187	58.82	.542	0	0	51.0	.328	87.2	6.7
23	20	....	51	350	873,600	39	484	44.82	.554	0	0	48.6	.72		
24	18	....	55	185	481,000	22	300	45.83	.624	0	0	23.3	.69		
25	34	13	5	260	652,878	19	450	29.23	.690	0	1 finger	52.0	1.41	33.5	.48
25	33	11	8	1,100	2,628,240	122	1,814	46.92	.690	0	0	40.9	1.32	35.9	.421
27	8	....	47	119	371,280	12	248	32.34	.696	0	0	34.5	.339		
28	....	34	3	498	1,371,876	78	1,070	60.00	.780	0	0			76.9	4.40
29	....	....	76	320	830,073	33	650	41.25	.783	0	0				
30	54	....	52	190	542,370	44	427	88.00	.788	0	0	250.	15.9		
31	43	36	10	946	2,564,688	109	2,621	43.60	1.022	0	2 fingers	39.6	2.7	90.2	5.10
32	23	30	23	756	2,212,908	131	2,299	59.19	1.030	0	10% arm	44.33	.758	55.8	3.3
33	25	18	7	600	1.670 758	140	1,783	87.50	1.064	0	0	63.4	.853	71.0	.71
34	3	....	69	297	818,532	14	882	17.58	1.078	0	2 fingers	10.0	.061		
35	30	40	20	320	932,886	48	1,087	53.33	1.166	0	½ thumb 1 finger	93.7	1.13	96.3	7.98
36	....	....	75	466	1,753,140	100	2,567	57.00	1.464	0	½ thumb 2 fingers				
37	24	27	13	409	1,104,410	65	1,901	59.09	1.722	0	3 fingers	80.0	.84	71.2	2.24
38	....	....	77	525	1,323,992	37	2,298	28.46	1.737	0	½ hand 1½ fingers				
39	....	....	80	570	1,541,280	147	2,853	98.00	1.851	0	parts of 2 hands				
40	36	12	41	2,350	6,192.250	131	15,467	21.48	2.498	2	2 fingers	15.0	1.50	28.0	1.50
41	44	....	60	1,512	4,358,936	338	11,116	72.54	2.780	1	0	74.3	2.71		
42	....	....	79	662	2,237,560	33	6,884	15.00	3.077	1	0				
43	47	24	21	875	2,615,505	93	8,052	35.77	3.080	1	1 partial perm. dis.	24.8	6.01	18.8	1.83
44	40	23	40	3,215	5,662,553	242	21,591	43.21	3.811	3	0	41.06	2.166	54.83	1.60
45	32	35	16	755	1,884,480	134	7,300	71.28	3.874	0	1 perm. dis.	84.0	1.31	75.6	4.52
												48.0	.53	53.6	.631
46	15	16	18	165	523,403	49	2,032	94.23	3.880	0	30% arm	14.7	.28	25.1	.18
47	5	4	37	170	532,000	17	2,106	31.96	3.960	0	1 eye	36.8	3.47	46.0	3.61
48	45	31	31	6,831	16,339,252	750	78,792	46.01	4.822	11	0	44.3	.486	26.6	.748
49	13	19	42	470	1,266,310	50	6,498	39.40	5.130	1	0				
50	....	....	72	380	1,027,520	61	6,858	59.90	6.697	1	0				
51	29	....	....	360	864,000	67	70,315	77.54	8.130	1	1 finger	59.3	1.02		
52	53	28	12	290	789,000	38	6,582	48.72	8.342	1	0	66.2	12.4	48.9	3.03
53	31	42	17	265	702,780	47	12,429	67.14	17.70	2	0	33.7	1.20	90.4	11.2
54	38	33	43	167	387,974	49	7,101	128.90	18.56	1	0	30.3	1.83	25.8	4.36
55	55	....	62	57	142,932	21	6,508	141.88	43.93	1	0	80.0	39.63		
1922 Totals				38,187	97,084,401	4,709	238,927	48.50	2.564	27					
1921 Totals				34,347	81,196,427	3,380	230,042	41.677	2.833						
1920 Totals				30,851	79,573,582	3,684	206,786	46.34	2.598						
Total, 3 yrs					257,854,410	11,773	675,755	45.677	2.620						

Note.—The frequency and severity rates are calculated according to the method adopted by the United States Bureau of Labor Statistics and by the International Association of Industrial Accident Boards and Commissions and recommended by the National Safety Council. Deaths and permanent injuries are weighted according to the standard scale adopted by the above organizations.

mills of all sizes. That shows that it is possible for both large and small organizations to do good safety work.

The frequency rate for 1922 was greater than for 1921, due, perhaps, to the large increase in the number of hours worked and the number of men employed. An increase in employment always means the introduction of inexperienced men and is likely to mean an increase in the accident rate. The safety work in these plants kept down the severity rate and, in fact, lowered it, even though the frequency rate showed an increase.

Many companies improved their 1922 records over their 1921 records. It is fair to state that the three year curves for most of the companies represented show them to have higher severity rates in 1921 than either 1920 or 1922. This, in the face of an increased number of employees during the last year, indicates that their safety work is conducted more intensively and that they are getting results.

The system of keeping the accident records is explained in the National Safety Council's Safe Practices Pamphlet No. 21 entitled "Accident Records," a copy of which will be sent upon application to any reader of THE PAPER INDUSTRY who is interested in this subject.

Power Plant Management

Performance Logs

By ROBERT JUNE, M. E.

THE keeping of performance records in the power plant is a rule rather than the exception even in small plants. In this respect there has been considerable change in practice during the past five or six years. When both coal and labor were cheap there was less incentive to keeping records. Today it is not a question of whether records shall be kept but rather of what form these records shall take in order that they may be of the greatest practical value.

It should be recognized, first of all, that the compilation of unnecessary data is to be avoided. By unnecessary data, we mean information relating to conditions which cannot be changed. The second consideration is that all records compiled should at all times be available to the men who control the figures which go to make up the records. That is to say, the boiler room superintendent should, at all times, know the amount of coal which he is using and he should have before him the records of previous performances for the sake of comparison.

As a matter of fact, records should be kept by the men who are actually doing the work and not by outside clerical help.

The next point is that the operating men should not be bothered with dollars and cents computations. They cannot control the price of coal, or oil, or waste, or other materials, and they cannot control the price of labor. They have nothing to do with overhead or fixed charges; therefore do not confuse them by asking them to deal with monetary values, but let your records be kept and let them stand or fall upon their economical use of coal in tons, oil in gallons, waste in pounds, and labor in hours. Records kept by the men place at their disposal information which enables them to determine the performance, ability and economy of the equipment under their charge, so they can strive to better the output while decreasing the consumption of materials and labor.

Reports to the management in which dollars and cents computations are involved should, in all cases, come through the accounting department where the costs of the various items can be readily and expertly set up. The amount of detail in the reports for the management and the frequency with which such reports are submitted depends upon the use to which they are to be put. Nothing unnecessary should be included. If the total output of the power plant and the total cost of fuel and wages are all that are desired, the report should be limited to these items.

If, however, reports are to go to an executive who exercises a direct hand in the supervision of the power plant, the reports should include such information as quality and quantity of coal, with special reference to the ash and moisture in the coal, the amount of oil, water and various boiler and engine room supplies used, and the separation of labor costs in the boiler and engine room help.

As the size of the plants increases it is desirable to include detail records of the number of hours of service rendered by each unit over daily, monthly and yearly periods, hourly flue gas temperature, barometric steam pressure and feed water temperature readings. By comparing such records a close check may be kept on plant efficiency and it is possible to determine the real value of expenditures for equipment so that future purchases may be made to best advantages.

Constant Records Valuable

It has been found practical dollars and cents value to keep constant records of such items as air pressure below grate, furnace draft, of CO_2 in flue gas, as well as to watch smoke, to record tests of boilers, pumps and engines, keep close track of repairs and note the capacity of stokers, coal and ash-handling equipment, etc.

The personal equation and the problem of the

FIG. VI. REPORT OF WATER SOFTENING AND PURIFYING SYSTEM

No. ..... Date ....., 19...

H—Hardness or Soap Test.
C—Indicates Causticity or Phenolphthalein Test.
A—Indicates Alkalinity or Methyl Orange Test.

Chemicals in Stock.... {Lime..... {Soda.....

Day	Date	Gallons Water Treated	Hours of Operation	Gallons Chemical Solution Lime Soda	Lbs. per 1,000 Gal. Solution Lime Soda	Time of Charges	Temperature Treated Water	Raw Water A	Raw Water H	Treated Water H	Treated Water C	Treated Water A
Sun.	.....	.....	.....	.....	.....	.....	.....	....	....	....	....	....
Mon.	.....	.....	.....	.....	.....	.....	.....	....	....	....	....	....
Tues.	.....	.....	.....	.....	.....	.....	.....	....	....	....	....	....
Wed.	.....	.....	.....	.....	.....	.....	.....	....	....	....	....	....
Thurs.	.....	.....	.....	.....	.....	.....	.....	....	....	....	....	....
Fri.	.....	.....	.....	.....	.....	.....	.....	....	....	....	....	....
Sat.	.....	.....	.....	.....	.....	.....	.....	....	....	....	....	....

Remarks:

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CHIEF ENGINEER.

individual plant will lead to placing emphasis on certain details of operation in one plant and placing this emphasis on other items in another plant. Log Sheets should properly be individualized to meet the particular conditions in the plant where they are used and it will be of interest to examine typical records which can be modified for individual use.

Figure 1 shows the daily log sheet turned in by the chief engineer of each steam power plant operated by one well-known company. It will be noted that

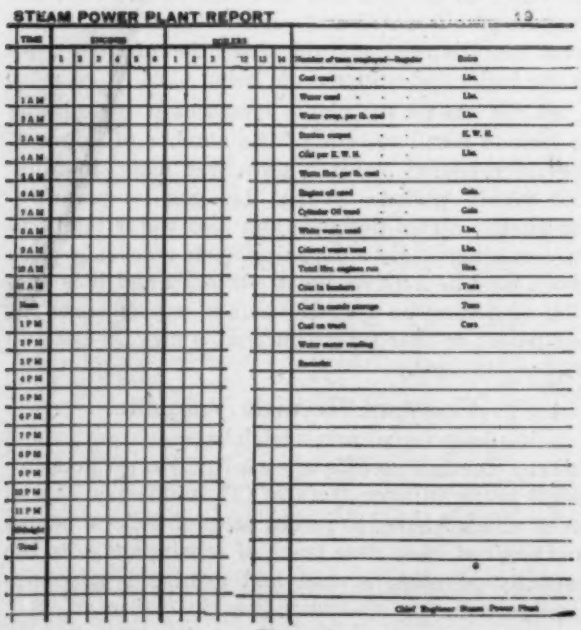

STEAM POWER PLANT REPORT

Figure 1

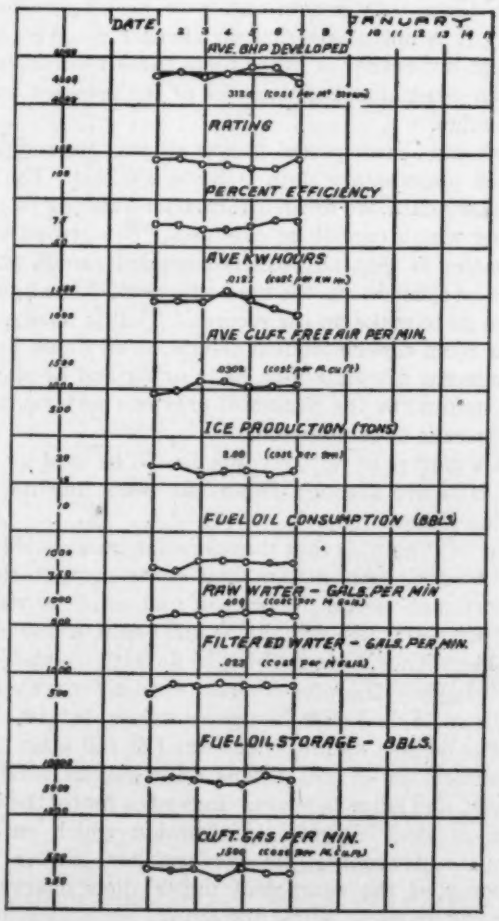


Figure 9

this log deals only with quantities of material and hours of operation.

Figure II is the report of men employed, used by the same company. This report is turned in by the chief engineer to the office of the superintendent of power plants. In the latter office, computations of the cost of labor are made and are added to the report so that the superintendent, at least, has the labor cost before him.

Figure III is the combined operating report for all the power plants and is made up from the logs shown in Figs. I and II, for all plants. The logs just referred to deal with the units of time and material, and the unit of output. A more intimate record of operating conditions, however, is desirable. This is to be obtained by making a record of such data as the following:

In conjunction with the use of the log in Figure IV, the chief engineer will also want a detail record of the time put in by different men on different jobs. This record can be in the form shown in Figure V.

In this case the chief engineer will make this form out in triplicate, filling in only the hour's column.

DAILY REPORT MEN EMPLOYED

Plant _____ Date _____ 192—

POSITION	DAY	AFTERNOON	NIGHT	TOTAL	Same list of work last day	REMARKS
Chief Engineer						
Watch Engineer						
Switchboard Operator						
Engine Oilers						
Boiler Room Foreman						
Fuel Foreman						
Fireman						
Fireman Helper						
Ash and Coal Foreman						
Machinist Foreman						
Machinist						
Machinists						
Machinist Helper						
Steam Fitter Foreman						
Steam Fitters						
Steam Fitter Helper						
Coal Crane Operator						
Coal Shoveler						
Boiler Repair Man						
Ash Handlers						
Coal-Ash Elevator Operator						
Stenographer						
Station Office						
Running Engineer						
Water-Softener Operator						
Clerk and Timekeeper						
Janitor						
Bricklayer Helper						
Extra Labor						
Yard Foreman						
Total						
Carpenter						
Boilermaker						
Bricklayer						
Total for all help						

_____ Chief Engineer

_____ Supt. Power Plants

Figure 2

OFFICE OF
Superintendent of Power Plants

DAILY OPERATING REPORT _____ 192__

DATA	AMMONIA		RATON	
	THIS YEAR	LAST YEAR	THIS YEAR	LAST YEAR
Total K. W. H. Generated				
Station Service K. W. H.				
Net K. W. H. Output				
Peak K. W. Load				
Min. hr. K. W. H.				
Ave. hr. K. W. H.				
Ave. Demand Factor				
Totals lbs. Coal Used				
Lbs. Coal per K. W. H.				
Total lbs. Water Used				
Lbs. Water per K. W. H.				
B. H. P. H. Generated				
B. H. P. H. in Service				
B. H. P. H. Rented				
Percentage of Boiler Rented				
Max. of B. P. of Boilers in Service				
Total lbs. Steam to Shop				
Coal in Bunker, Tons				
Coal in Storage, Tons				
Total Coal, Tons				
No. of Men Employed				

Report power failure and cause, also larger items of repairs or inspection.

Compiled by _____ Approved _____ Supt. of Power Plants

Figure 3

Form 11138-500-1-20 SHEET No. 1

BOILER HOUSE OPERATION COSTS

PLANT FROM TO

	Man Hrs.	Av. Rate Per Hr.	Total Cost	Cost Per Bbl. Oil Fired	Cost Per 1000 lbs. Water Evaporated	Cost Per Boiler h. p. hr.
(1) Fuel Petroleum F. O. B. Plant						
(2) Unloading Oil and delivering to storage tanks, including pumping into working tanks						
(3) Steam for pumping to storage and working tanks, and heating systems						
(4) Delivering oil from working tanks to burners						
Total delivering oil from tanks to burners						
(5) Firing boilers including cleaning of burners						
(6) Boiler Cleaning						
(7) Boiler room supplies (oil, waste, compound)						
(8) Repairs, Labor— (a) Buildings						
(b) Oil Lines—supply pumps and heating systems						
(c) Boilers, breechings and stacks						
(d) Oil burners and oil feed pumps						
(e) Boiler room piping						
(f) Tools						
Total Repairs—Labor						
(9) Repairs—Material— (a) Buildings						
(b) Oil Lines—Supply pumps and heating systems						
(c) Boilers, breechings, stacks						
(d) Oil burners oil feed pumps						
(e) Boiler room piping						
(f) Tools						
Total Repairs—Materials						
Total Repairs—Labor and Material						
(10) Direct boiler room superintendence						
(11) Proportion of cost of Power Supt and staff						
Total Superintendence						

Form 11138-500-1-20 SHEET No. 2

BOILER HOUSE OPERATION COSTS—Continued

PLANT FROM TO

	Man Hrs.	Av. Rate Per Hr.	Total Cost	Cost Per Bbl. Oil Fired	Cost Per 1000 lbs. Water Evaporated	Cost Per Boiler h. p. hr.
(12) Steam for oil feed pumps						
(13) Steam for burners						
(14) Steam for forced draft						
(15) Compressed air for cleaning tubes						
(16) B. R. Steam for blowing tubes						
(17) Electricity for lighting at ..... per kw. hr						
Total Boiler Room Auxiliaries						
(18) Water at ..... per M gal. delivered to reservoir						
(19) Electricity for pumping feed water to heater at ..... per kw. hour						
(20) Steam for B. F. Pumps						
(21) Steam for boiler cleaning air compressors						
(22) Labor in operation boiler feed pumps and boiler cleaning air compressors						
(23) Supplies B. F. Pumps and B. C. air compressors						
(24) Repairs, Labor B. F. Pumps and B. C. air compressors						
(25) Repairs, Material B. F. Pumps and B. C. air compressors						
Total water for boiler feed and boiler cleaning delivered to boilers						
Grand Total: Costs of Boiler Room						

Total Fuel Oil Fired (Bbls.) .....
Total Water fed to Boilers .....
Total Water Blown Down (including leakage) .....
Total Lbs. Water Evaporated .....
Total B. H. P. Hours Delivered .....
Average F. W. Temperature .....
Average Steam Pressure .....
Equivalent evaporation from and at 212°—lbs. Water per lb. Dry Fuel Oil .....
Actual % Rating Developed .....
Average B. T. U. per lb. Dry Fuel Oil (calculated) .....
Average % Moisture in Fuel Oil .....
Average B. T. U. per lb. Fuel Oil Fired .....
Average Boiler Efficiency .....

Figure 7

The office of the superintendent of power station will fill in rates and amounts, and send a copy of each to the accounting department, who will set up the charges. By constant reference to these time cards, the chief engineer will have a ready comparison

FIG. IV. DAILY OPERATING LOG

	12-8 A. M.	8-4 P. M.	4-12 P. M.
Feed Water Meter Reading			
Lbs. Water by F. W. Meter			
No. of Boiler Blowdowns..			
Aver. Inches Per Blow....			
Lbs. Water Blowdown....			
Nos. of Boilers Filled....			
Lbs. of Water Used for Filling			
Lbs. Water Evaporated...			
Aver. Steam Pressure.....			
Aver. F. W. Temperature.			
Factor of Evaporation....			
Aver. H. P. Developed.....			
Aver. H. P. Per Boiler.....			
Aver. Per Cent Rating.....			
Total Lbs. Coal Fired.....			
Lbs. Ash and Refuse.....			
Per Cent Ash and Refuse.			
No. of Combustion Chambers Cleaned			
Per Cent of Moisture in Coal			
Total Lbs. Dry Coal Fired.			
Average CO_2			
Average CO			
Boiler Efficiency Per Cent (total 24 hrs. only).....			
Above Standard Per Cent (total 24 hours only)...			
Below Standard Per Cent (total 24 hours only)...			
Aver. Evap., Actual.....			
Aver. Evap., Fr. and at 212 Per Lb. Dry Coal.....			
No. of Fans Operated.....			
FOREMAN.			

between the performance on any given date and the average time required for similar work.

Figure VI is a report on the water softening and purifying systems. Reports of this character should not only be used for water softening apparatus, but for any other special equipment.

Figure VII is a form for weekly, monthly and yearly reports of boiler house operating costs. This

FIG. V. POWER HOUSE TIME CARD

Location ..... Date ....., 19...

NATURE OF WORK	Acct. No.	Hours	Rate	Amt.
Switching Cars for Roadway.				
Cleaning Yard				
Repairs to Boilers, P. H. Machinery, Stokers, Conveyors, etc.				
Engineer				
Oiler				
Water Tender				
Fireman				
Boiler Washing				
Unloading Coal				
Miscellaneous P. H. Labor...				
Wheeling Coal and Ashes....				
Cleaning Fires				
Loading and Delivering Coal to Sub-Stations				
Loading and Delivering Coal to Station				
Work for Motive Power Department				
Totals				

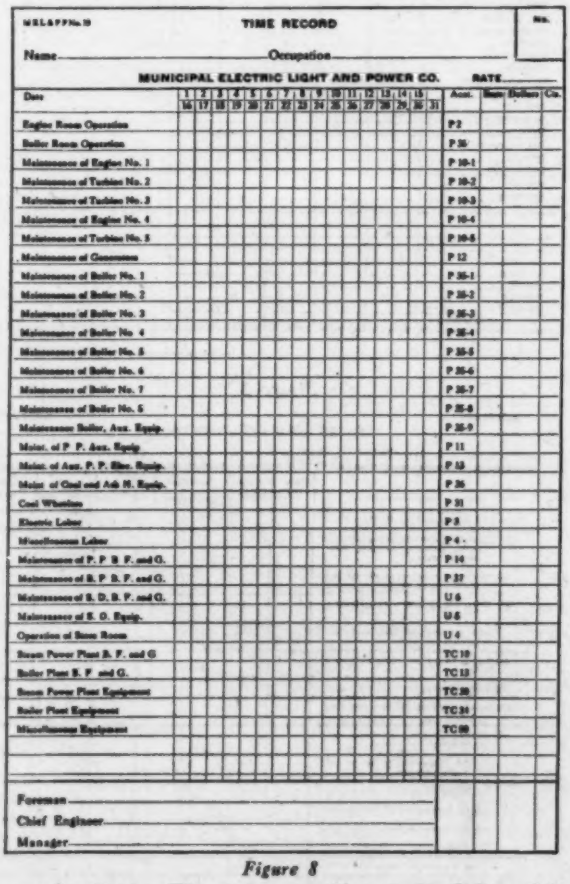
Correct.
(Signed) .....
Chief Engineer.

chart was developed by one of the keenest engineering organizations in the country and is in constant use for recording costs in a large number of power plants under its supervision.

Figure VIII is the semi-monthly time record employed by another operating company with a municipal power plant. This record shows the maintenance cost of all important units of equipment.

Figure IX is a daily graphic chart kept in the power superintendent's office of the operating company referred to above. This chart is plotted daily on a cross section of cloth. At the end of every month, the monthly average curve is drawn on the chart in red. This graphic record is always available and when desired the charts for a year or more back may be tacked up on the bulletin board as an object lesson to all operating men.

As stated above, the performance log should be drawn up to meet the individual conditions obtaining



TIME RECORD

Name ..... Occupation .....

MUNICIPAL ELECTRIC LIGHT AND POWER CO. RATE .....

Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Acct.	Steam	Boilers	Co.
Engine Room Operation																																P 2			
Boiler Room Operation																																P 35			
Maintenance of Engine No. 1																																P 10-1			
Maintenance of Turbine No. 2																																P 10-2			
Maintenance of Turbine No. 3																																P 10-3			
Maintenance of Engine No. 4																																P 10-4			
Maintenance of Turbine No. 5																																P 10-5			
Maintenance of Generators																																P 12			
Maintenance of Boiler No. 1																																P 35-1			
Maintenance of Boiler No. 2																																P 35-2			
Maintenance of Boiler No. 3																																P 35-3			
Maintenance of Boiler No. 4																																P 35-4			
Maintenance of Boiler No. 5																																P 35-5			
Maintenance of Boiler No. 6																																P 35-6			
Maintenance of Boiler No. 7																																P 35-7			
Maintenance of Boiler No. 8																																P 35-8			
Maintenance Boiler, Aux. Equip.																																P 35-9			
Maint. of P. P. Aux. Equip.																																P 11			
Maint. of Aux. P. P. Elec. Equip.																																P 13			
Maint. of Coal and Ash H. Equip.																																P 35			
Coal Wheelers																																P 31			
Electric Labor																																P 3			
Miscellaneous Labor																																P 4 -			
Maintenance of P. P. B. F. and G.																																P 14			
Maintenance of B. P. B. F. and G.																																P 37			
Maintenance of S. D. B. F. and G.																																U 6			
Maintenance of S. O. Equip.																																U 5			
Operation of Boom Room																																U 4			
Boom Power Plant B. F. and G																																TC 19			
Boiler Plant B. F. and G.																																TC 13			
Boom Power Plant Equipment																																TC 29			
Boiler Plant Equipment																																TC 24			
Miscellaneous Equipment																																TC 99			
Foreman																																			
Chief Engineer																																			
Manager																																			

Figure 8

in each plant. There is one danger in doing this, however, in that there is frequently a temptation to include too much irrelevant data. The things with which everyone should be concerned are those factors in operation which have an important bearing upon the total cost of production and which can, in some measure, be controlled.

It is perfectly useless for operating men to make records covering factors which cannot be controlled.

Anti-Friction Bearings in the Pulp and Paper Industry

By GEO. H. SPENCER
SKF Industries, New York.

Paper read before the annual meeting of the Technical Association of the Pulp and Paper Industry, held in New York, April 12, 1923.

WHENEVER improvements in paper machinery necessitate designs which incorporate heavier loads, higher speeds, etc., the engineer and machinery designer are confronted with problems of increased bearing loads, shaft stresses, shaft deflections, lubrication, maintenance, and numerous other items that follow in the wake of such improvements. The success of the anti-friction bearing on the slow speed machines has brought them into prominence when considering improvements for machines of higher speeds. The selection of the proper anti-friction bearing size and a suitable and permanent mounting design is, like many other questions, best determined by the combined studies of the anti-friction engineer whose previous experience covers hundreds of applications, and the paper mill engineer whose knowledge of the operating conditions of the various rolls is invaluable.

Cylinder Machine

It was about fifteen years ago when ball bearings were first used on papermaking machinery in the United States, one of the first applications being that to cylinder molds and couch rolls of the cylinder machine. These rolls are relatively slow turning but early installations of properly selected bearings, properly housed against intrusion of water have proven the success of the anti-friction bearing and its application to the cylinder mold might be considered today as universal. It has been found where ball bearings are used on cylinder molds, that the usual gearing arrangement for driving the molds can be eliminated and that the molds can be turned by the drag of the felt alone. This has eliminated the strains which are set up in the felt between adjacent gear driven molds, due to the different surface speeds, and it has been found by some mills that the application of ball bearings and the elimination of driving gears has resulted in increases in felt life of as much as 50 per cent.

Another location on the cylinder machine at which the anti-friction bearing has justified its worth is the primary or intermediate press section in which the series of top and bottom rolls are driven only by contact with the felt and the anti-friction bearing with its low frictional qualities has permitted of easy turning of these rolls with minimum drag on the felt and stock resulting in a better grade of stock and longer life of felts. There are numerous other rolls in the cylinder machine such as return felt drum, felt carrying rolls, and main presses, to which the anti-friction bearing has been applied but time is too limited to go into a discussion of these applications at this time.

High Speed Fourdrinier

The type of machine which seems to hold the prominent place in the paper industry today is the high speed Fourdrinier for book, news, tissue, and kraft, and the greatest part of this anti-friction bearing discussion will apply to this type of machine and particularly as pertaining to the wet and dry sections.

Taking up the question of the wet section first, it might be well to discuss briefly the nature of the operation of the plain bearing and show thereby the superior operation of the anti-friction bearing. The plain bearings on the various rolls of the wet section require considerable attention because of the fact that water is always present, free to enter the bearing box, thereby disintegrating and destroying the lubricant. Again there is a rubbing of the shaft against the journal box with the resultant high friction and wear which will cause the rolls to operate inaccurately and produce additional strains on fourdrinier wires.

Ball bearings have been applied to various rolls of Fourdriniers for a number of years past and it has been found that properly selected bearings, mounted in properly designed housings, will operate satisfactorily without a great amount of attention. Some mills have found, after applying anti-friction bearings to breast, table and wire rolls, that wire life has been increased as much as 20 per cent, which is unquestionably due to the low coefficient of friction of the anti-friction ball bearing which is .0017 as compared with the coefficient of the well lubricated plain bearing which, under average conditions, is .015.

Fourdrinier Wires

There should be considerable interest in the work to be done by a committee recently appointed for the purpose of making a study of Fourdrinier wire life and it will unquestionably be found that such items as percentage of grit in clay, method of cleaning wires, quality of water, unbalanced rolls, improper suction and drag on suction boxes, sorting and winding of wire, friction in roll bearings, and running tension in wire, will all bear certain relations to the factors affecting the life of wires.

One of the main causes of shortness of life and

TABULATION NO. 1—TENSILE TEST ON NO. 60 WIRE. SPECIMEN, ONE INCH WIDE

Load Pounds	Length Inches	Elongation Inches	Elongation Per cent	Permanent set Inches	Permanent set Per cent	Load Pounds	Length Inches	Elongation Inches	Elongation Per cent	Permanent set Inches	Permanent set Per cent
5	20.805	.....	.....	.....	.....	5	20.832	.....	.....	.....	.....
20	20.832	0.027	0.130	0	.....	65	20.949	0.144	0.692	0.047	0.226
5	20.805	.....	.....	.....	.....	5	20.852	.....	.....	.....	.....
25	20.843	0.038	0.182	0	.....	70	20.976	0.171	0.822	0.066	0.317
5	20.805	.....	.....	.....	.....	5	20.871	.....	.....	.....	.....
30	20.852	0.047	0.266	0.007	0.0336	75	21.031	0.226	1.086	0.113	0.543
5	20.812	.....	.....	.....	.....	5	20.918	.....	.....	.....	.....
35	20.867	0.062	0.298	0.007	0.0336	80	21.101	0.296	1.422	0.179	0.860
5	20.812	.....	.....	.....	.....	5	20.984	.....	.....	.....	.....
40	20.875	0.070	0.336	0.007	0.0336	85	21.203	0.398	1.912	0.273	1.310
5	20.812	.....	.....	.....	.....	5	21.078	.....	.....	.....	.....
45	20.887	0.082	0.394	0.007	0.0336	90	21.363	0.558	2.680	0.429	2.060
5	20.812	.....	.....	.....	.....	5	21.234	.....	.....	.....	.....
50	20.894	0.089	0.428	0.011	0.0528	95	21.594	0.789	3.790	0.656	3.150
5	20.816	.....	.....	.....	.....	5	21.461	.....	.....	.....	.....
55	20.906	0.101	0.486	0.015	0.0720	100	21.852	1.047	5.028	0.898	4.315
5	20.820	.....	.....	.....	.....	5	21.703	.....	.....	.....	.....
60	20.929	0.124	0.596	0.027	0.1297	Broke at 130 lb. Length after rupture, 23.672 inches.					
5	20.832	.....	.....	.....	.....						

$$\frac{23.672 - 20.805}{20.805} \times 100 = 13.8\%$$

deterioration of Fourdrinier wires is the wear caused by friction of the under side of the wire against certain parts of the machine. There is friction, and consequently wear, wherever the moving wire comes in contact with some part which has not the same surface speed as the wire. For instance, when the wire travels over a table roll which turns true and with practically no friction in the bearings, it does not slide over the roll and there is no wear, but suppose that the table roll is not true and does not turn freely, then the wire will slide over it trying to make it turn. The friction is then proportional to the difference in surface speed between the wire and the table rolls. This same condition exists for all rolls of the wet end except the couch roll which is mechanically driven. In the case of the stretch roll and one or more carrying rolls the upper side of the wire will show wear.

To demonstrate the small amount of energy necessary to turn a ball bearing equipped table roll as compared with a plain bearing equipped roll a test was conducted with rolls for a 202-inch machine and the results showed that a weight of one ounce tied to a string wrapped around the ball bearing equipped roll would keep it turning whereas a weight of seven ounces tied to a string and wrapped around the plain bearing equipped roll was necessary.

It was found on shaking tables that wear in plain bearings will permit of a varying degree of lateral play of adjacent rolls and consequently these rolls will, during each shake, slide laterally across the wire, thereby causing additional wire wear. With ball bearings it is possible to stabilize each roll against this endwise or lateral play and by so doing the life of wire can be increased to some extent.

Wire Tension

The two points of particular interest to the maker of anti-friction bearings are elimination of friction in the roll bearings and running tension in the wire. This running tension is something that is quite important because the resultant of this and the weight of the rolls produces the load on the bearings and although it has been possible to obtain accurate data concerning weights applied, it has been found difficult to secure definite information pertaining to the running tension. Calculations based upon weighted stretch rolls, also upon hand-adjusted stretch rolls have been made but there are indications that the tensions thus determined do not correspond with the actual running tensions.

In discussing this situation with the wire manufacturers it was learned that when making a wire of 70 ft. 6 ins. length of 0.008 inch brass wire, 70 warp, 46 weave, 3½ inches of the total length is cut off after the wire is woven thereby shortening it to 70 ft. 2½ ins. The ends are then sewn and welded together and the wire stretched so that the wire becomes 70 ft. 10½ ins., or an elongation of 0.94 per cent. When the stretch load is released it is found that the wire has stretched and taken a permanent set so as to give the desired 70 ft. 6 ins. length, or a permanent set of 0.415 per cent.

Samples of No. 60 and 70 wire were obtained from the wire manufacturers and submitted to the S. K. F.

TABULATION NO. 2—TENSILE TEST ON NO. 70 WIRE. SPECIMEN, ONE INCH WIDE

Load Pounds	Length Inches	Elongation Inches	Elongation Per cent	Permanent set Inches	Permanent set Per cent	Load Pounds	Length Inches	Elongation Inches	Elongation Per cent	Permanent set Inches	Permanent set Per cent
5	16.980	.....	.....	.....	.....	5	17.000	.....	.....	.....	.....
20	17.000	0.020	0.118	0	.....	65	17.090	0.110	0.648	0.025	0.1470
5	16.980	.....	.....	.....	.....	5	17.005	.....	.....	.....	.....
25	17.010	0.030	0.177	0	.....	70	17.110	0.130	0.766	0.040	0.2360
5	16.980	.....	.....	.....	.....	5	17.020	.....	.....	.....	.....
30	17.010	0.030	0.177	0.005	0.0294	75	17.180	0.200	1.180	0.110	0.6480
5	16.985	.....	.....	.....	.....	5	17.090	.....	.....	.....	.....
35	17.020	0.040	0.236	0.005	0.0294	80	17.230	0.250	1.470	0.140	0.8250
5	16.985	.....	.....	.....	.....	5	17.120	.....	.....	.....	.....
40	17.025	0.045	0.265	0.005	0.0294	85	17.350	0.370	2.180	0.250	1.470
5	16.985	.....	.....	.....	.....	5	17.230	.....	.....	.....	.....
45	17.035	0.055	0.324	0.010	0.0590	90	17.530	0.550	3.240	0.430	2.530
5	16.990	.....	.....	.....	.....	5	17.410	.....	.....	.....	.....
50	17.045	0.065	0.383	0.015	0.0884	95	17.770	0.790	4.650	0.670	3.950
5	16.995	.....	.....	.....	.....	5	17.650	.....	.....	.....	.....
55	17.060	0.080	0.472	0.015	0.0884	100	18.070	1.090	6.420	0.960	5.660
5	16.995	.....	.....	.....	.....	5	17.940	.....	.....	.....	.....
60	17.070	0.090	0.530	0.020	0.1180	Broke at 120 lb. Length after rupture, 19.190 inches.					
5	17.000	.....	.....	.....	.....						

$$\frac{19.190 - 16.980}{16.980} \times 100 = 13.0\%$$

Research Laboratory, Philadelphia, Pa., for test. It was thought that the running tension in the wire would probably not exceed the stretch tension to which the wire is subjected during its manufacture, such as outlined in the previous paragraph, therefore, the specimens sent to the laboratory were tested in such a way as to determine the load per inch of width necessary to give 0.94 per cent elongation and by referring to the following tabulations, which give complete results of the laboratory test, particularly tabulation No. 2, covering 70 mesh wire, you will see that the stretch tension is between 70 pounds and 75 pounds per inch of width of wire. From this tabulation it will also be noted that the percentage of permanent set of 0.415 per cent falls between tested loads of 70 pounds and 75 pounds per inch of width. It will also be noted that the breaking strength in this wire is 120 pounds per inch of width.

The maximum running tension in the wire takes place between the suction boxes and couch roll, and may fall between 70 pounds and 120 pounds per inch of width of wire. It is possible that the committee on Fourdrinier wires will, during their study of the wire problem, be able to obtain certain definite information concerning this point.

In the following tabulations and curves, data are given showing total elongation and permanent deformation of the wire gauze at variable stresses. The permanent deformation was obtained by each time relieving the load to five pounds. The amount of permanent stretch was measured. The dotted curve represents the latter values, while the full curve represents the total amount of deformation. From the curves it is seen that the elastic limit cannot sharply be determined, but it is approximately between twenty and forty pounds per inch width.

It is impossible to determine the elastic limit of such a material. There will be some permanent set at almost zero load.

Based upon this study of the probable wire tension it has been possible to arrive at certain load factors for the determining of adequate bearing sizes.

Drier Section

Ball bearings have been applied to felt driers and there are a number of installations in the United States which have been running for several years without the slightest trouble. It therefore might be considered that this application has passed the experimental stages. Due to the low coefficient of friction of the ball bearing and the fact that these rolls are usually turned by contact with the felt only, the drag on the felt is materially reduced and mills have stated that the life of drier felts has been substantially increased when these rolls were changed from plain bearings to ball bearings.

The successful operation of ball bearings on the felt drier, the proven ability to meet the load and temperature conditions, the ease of proper mounting to care for the expansion and contraction of the drier has brought it into the limelight for serious consideration on main paper driers.

Tensile Test on Wire

One of the most recent developments has been the construction of a 700-foot per minute fourdrinier machine having every roll on the machine equipped with self-aligning ball bearings including the seventeen 60x173 inch driers. After the driers had been set in place and all gears in mesh, but doctors and steam joints not installed, one man was able to start in motion the entire section of seventeen driers by pulling upward by hand on the spoke of one of the main gears. Another interesting feature of this machine is the small amount of lubrication attention necessary. All ball bearing housings were properly filled upon installation and ran during a four months' trial and operating period without attention and it was found upon opening up some of the housings that the lubricant was in excellent condition. Instructions, however, have been issued that the bearings should be systematically looked at once every two or three months, as a precaution against deterioration of lubricant.

In addition to the power and lubrication savings effected by mounting drier cylinders on anti-friction

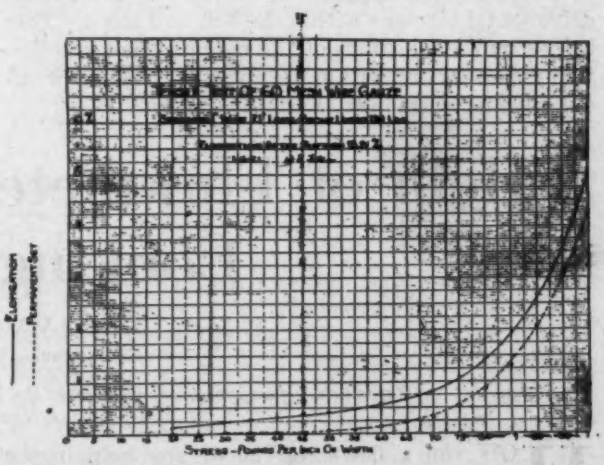
TABULATION NO. 3—TENSILE TEST ON NO. 60 AND 70 WIRE
The test results are compiled in the following table

Ultimate Strength and Elongation

Mesh No.	Width of specimen, in.	Breaking load, lb.	Breaking load per in. of width, lb.	Distance between jaws, in.	Elongation at rupture, in.	Elongation at rupture, %
60	3	425	141	4⅛	⅞	20.9
60	3	410	136	4¼	⅞	19.1
60	3	400	133	4⅛	⅞	20.6
70	3	340	113	4	⅝	13.1
70	2⅞	360	125	4⅛	¾	18.2
70	2⅞	350	122	3⅞	¾	19.3

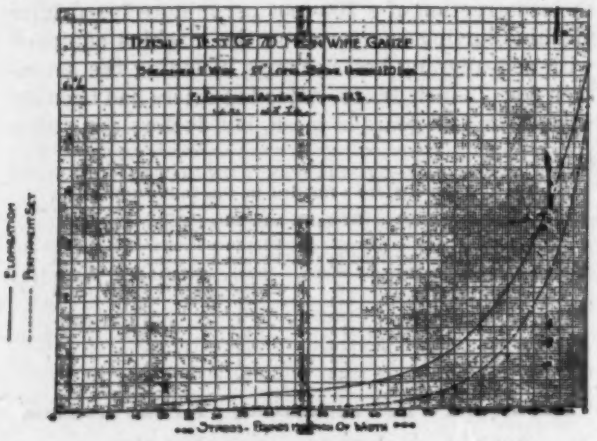
Load Required to Make Approximately 9 Per Cent Elongation

Mesh No.	Width of specimen, in.	Load required, lb.	Load req. per inch of width, lb.	Distance between jaws, in.	Elongation under load, in.	Elongation %
60	3	335	111	4.062	0.363	8.94
60	3	320	106	3.953	0.357	9.04
60	3	340	113	4.093	0.369	9.02
70	3	305	101	3.937	0.343	8.74
70	3	310	103	3.844	0.356	9.26
70	3	310	103	3.875	0.355	9.17



bearings there appear to be advantages dealing directly with the improvement of the quality of the paper and also the reduction in felt wear and broke.

With the main driers geared together the drier felts and stocks, running through the section, will be



subjected to varying strains between adjacent cylinders because of the difference in surface speed. Manufacturers have stated that the usual tolerance for grinding the outside diameter of driers is 0.01 inch. The maximum difference, therefore, between any two cylinders can be 0.02 inch or a difference of approximately $\frac{1}{16}$ inch measured on the circumference. On high speed machines running 1,000 feet per minute a five-foot drier turns approximately 65 r.p.m. and, consequently, there can be a maximum difference in surface speed of adjacent cylinders of approximately 4 inch per minute which must be taken care of by slippage of the felt with probable detrimental stresses within the felt and stock. This brings up the questions of the magnitude of stresses that may be set up within the fibres of the stock without causing permanent harmful effects.

By the elimination of the gearing in a drier section, thereby permitting each cylinder to turn independently of the other differences in diameter causing differences in surface speeds would not be detrimental and it is possible that one of the future developments will be the more general use of ball bearings on main paper driers which, due to their low frictional qualifications, may permit of the driving of the driers by contact with the stock or with the felt only.

Miscellaneous Machinery

Ball bearings have been applied and used successfully for a number of years on machines such as the Jordan engine, refiner, disc barker, chip crusher, deinking and de-fibring machines, slitters and rewinders, etc., and each one of these applications holds its interesting problem but a detailed discussion will be withheld until some future time.

Such problems as the application of anti-friction bearings to pulp grinders, holland type beaters, calender stacks, etc., are being studied and it is possible that with the new type of spherical roller bearing now on the market these particular problems can be solved satisfactorily.

Advantages of Co-operation

Work on the various problems in the pulp and paper industry with the various mills and machinery manufacturers has been found most interesting and enjoyable and we take this opportunity of thanking all those who have co-operated with us so earnestly. To carry on this work still further, thereby giving to the Association and the industry as a whole the greatest advantages that can be obtained by the use of anti-friction bearings, we need a continuance of this co-operation and in fact an opportunity to work even more closely with the various mills, manufacturers, and appointed committees.

Help of Flowmeters in the Sulphite Cooking Process

By HALVAR LUNDBERG
Fraser Companies, Ltd., Edmunston, N. B.

Paper read before the annual meeting of the Technical Association of the Pulp and Paper Industry, held in New York, April 11 1923.

HOW can a flowmeter be of any help in the cooking of sulphite pulp?

Many mills have at the present time installed separate flowmeters on each digester and are taking a reading of the steam consumption either per twenty-four hours or per cook, and I am sure many a superintendent has noticed the big variation in steam consumption from cook to cook but without giving any deeper thought to the question, "Why does this big variation occur?" I have in many cases noticed a variation as high as 40 per cent in the steam consumption.

Quick Cook Process Only Considered

In this particular article I am only going to consider the quick cook process as it is by this method—where the steam comes into direct contact with the chips and later with the fiber—that we have to use the utmost care when using the steam.

The steam is used in the quick cook method both

as a source of heat and for maintaining proper circulation in the digester.

We need a certain temperature for bringing about the reactions necessary to dissolve the non-fibrous matter in the wood, and when this point is reached, a good circulation, without which it is impossible to get a uniform product.

I have also found that control of the steam is necessary for keeping down the sulphur consumption, a point I am going to discuss further later on.

Thus steam is necessary for difficult purposes and the greater part of it is used for bringing the digester up to desired temperature.

Steam entering a digester is being condensed at the same time it is giving up its heat. We have therefore to figure with a continual dilution of the acid as long as the steam valve is open. At the same time, to permit the admission of the steam, we are forced to relieve the digester, and relieving is the same as robbing the digester of the sulphur dioxide. If we are not, therefore, careful about our initial temperature; that is, the temperature of the acid and chips, we shall sometimes come into very serious difficulties. I am sure every sulphite superintendent has noticed trouble with his pulp at the beginning of cold weather, and I blame most of it to neglect of the temperature of the cooking acid. We must remember that even a difference of 10 degrees Fahr. of the cooking acid represents a difference of about 200 pounds of steam or more per ton of air dry pulp.

Knowledge of Chemical Reactions Limited

Our knowledge of the chemical reactions which are taking place during different stages of the cooking process, is very limited, while we find almost as many cooking methods as there are sulphite mills. This lack of knowledge has brought about a further evolution of control of physical conditions, as we have found, that if we can keep the acid at the same strength and temperature, use chips of the same size and moisture content and work under the same temperature and pressure conditions, with control of the steam we are bound to get a uniform pulp. It is therefore necessary that we should, by continual tests and analysis, follow these conditions and try to keep them as much alike as possible from cook to cook.

Use of Recording Instruments

For these reasons most of our mills now have their digesters equipped with recording instruments for pressure and temperature and automatic regulating valves for keeping a constant pressure in the digester. There is, however, still much more to be done along the line of utilizing the steam to the best effect.

"If I don't get steam, I can't make pulp," is a standing expression, and it is quite true, that we must not be careless in its use. As we have seen before, steam causes a dilution of the acid. If we, therefore, at one time are carelessly using 40 per cent more steam than another time, we can see the impossibility under such conditions of controlling the cooking process, and the product cannot be as uniform as desired.

I therefore strongly recommend the installation and use of separate flowmeters for each digester.

Another Advantage of Flowmeters

Another advantage of flowmeters is that they indicate if the cook is exactly following given instructions. Supposing the pulp is not up to desired quality and you want to make a change in your cooking method. The change is usually not so great that you can notice any difference in temperature and pressure. How will you be able to give definite instructions to be followed without flowmeters? With help of flowmeters you can do so and every minute see for yourself if the right thing is being done or not.

An old sulphite cook told me not long ago his opinion about the flowmeters, saying: "With one of these flowmeters a baby can start cooking pulp without one day's practice by only following given instructions." This shows best the possibilities in the use of flowmeters.

Uniform Steaming

One very often hears old cooks saying that they never steam two digesters alike. They seem to be proud of it, but in my opinion the uniform steaming of the digester is the most important thing in the sulphite cooking process for getting a first-class, uniform product.

For my part I never allow the steam valve to be opened too much at the start of the cook but the steam given is increased in amount successively every tenth or fifteenth minute until the valve is full open after one to one and a half hours. Going too fast at the beginning the digester is likely to be bored, but by using the slow starting method, I am only helping the boiler house but I am more sure of getting a good circulation in the digester. It is, however, not to be taken as a certainty, as the digester can be bored even now and the usual care must also be taken.

No Difficulties in Fixing Amount of Steam

With the use of the flowmeter there are no difficulties in fixing the amount of steam that is to be added at each interval. We can thus steam the digester in the same way, cook after cook, which, as I said before, is very important for getting a uniform quality of pulp.

A certain minimum temperature is necessary in the digester before the chemical reaction begins. It is therefore important that we keep track of this minimum temperature and always try to reach the same after a certain fixed period. The flowmeter helps us with that. If we have a steady steam pressure, a certain amount of steam always corresponds to a definite amount of heat units. This if, we, cook after cook, add a certain amount of steam, we supply

the same quantity of heat to the digester each time, providing other conditions are the same.

The amount of steam necessary for reaching this minimum temperature varies with the time of the year, depending on the temperature of the wood and the radiation losses. The temperature of the acid does not need to vary if proper control is kept as it is easily checked with the cooling water and the cook ought to be responsible therefor.

A Point Requiring Careful Attention

Depending on the size of the digester and cooking time desired the digester should come to pressure in a maximum time of three hours. This is a point to pay attention to because, if the digester is equipped with automatic regulating valves, when the digester has reached pressure the steam is entirely shut off. The time for starting the relief is a little before pressure is reached to secure a uniform steam flow, remembering that the digester has not yet been uniformly heated, while entirely closing of the steam valve and afterwards opening it wide can at this time also cause a boring of the digester. The flowmeter helps us to detect this point, and if the cook is watching his digesters closely there is no reason for a cut off in the steam flow.

The above mentioned minimum temperature ought to be reached after five hours and the integrater on the flowmeter tells us when enough steam has been added for reaching this point. Now the digester is either shut in for a certain period or the steam valve partially closed only admitting a certain amount of steam, depending on quality and cooking time desired. The shutting in of the digester gives a bigger saving in steam and is mostly preferred.

Temperature Control

If the temperature in the digester is raised a little above this minimum temperature, the cook can be finished up without adding any more steam and by slowly relieving. I have made several cooks giving steam for four and a half hours and finished them up after eight and a half to nine hours' total cooking time, and got a very uniform pulp. However, although the blowing test was lower than customary, we remarked a gradual increase in the sulphur consumption. This is a very interesting circumstance, which I think ought to be more studied. However, it shows that steam has to be used towards the end for driving out the sulphur dioxide which otherwise seems to form some chemical compounds with the non-fibrous matters, getting lost in the waste liquor.

Steam Control

The steam necessary for this purpose should, however, be kept down to the lowest possible amount, but has to enter the digester uniformly. A small amount of steam uniformly entering a digester gives more service than a greater quantity added non-uniformly, and it is here during the later part of the cooking that a considerable saving can be made in the steam consumption. I go further to say that most of our mills can lower their steam consumption five to ten per cent by only checking this part of the cook, and I can almost guarantee a more uniform pulp and higher yield per digester.

Pointers for the Engineer

By W. F. SCHAPHORST, M. E.

High Boiler Pressures

IT will interest paper mill engineers to know that in Gotenburg, Sweden, there is a boiler that operates at 1,500 pounds pressure per square inch. The boiler is a very unusual one. The steam is formed in revolving tubes which are rotated for the purpose of enforcing contact between the water and the hot shell so that maximum heat will be absorbed and so that steam bubbles will not linger while in contact with the surface. As long as there are steam bubbles between water and a boiler shell, heat transmission efficiency is bound to be low. By means of the centrifugal force caused by the rotating tubes, heat transmission efficiency is increased.

It may also interest readers to know that in the United States there is a plant operating 400 pounds per square inch—a new central power station of the Public Service Co. of Northern Illinois. A still higher pressure of 550 pounds per square inch is carried at the Philadelphia plant of the Ohio Power Company at Waukegan.

Higher pressures and higher temperatures mean increased boiler efficiencies, for which engineers are constantly striving.

50% and 100% Belt Slip

NOT long ago I read a statement by a belt operator in which he wrote as though 50 per cent belt slip is a common matter. However, it has been my experience that 50 per cent slip seldom occurs. When slip becomes as serious as that it can be "seen," because the speed of the driven pulley will not be constant, and if the load transmitted amounts to anything at all the belt will get hot and will smoke. Fifty per cent slip means that close to 50 per cent of the power leaving the driven pulley is "lost," and its loss must go toward heating either the belt or the pulleys, or both, and if the power is a considerable amount it is likely to cause the pulleys or the belt to burn.

The above writer made the further astounding declaration that machines are often stalled, coming to a complete rest while the shaft mantains its full

speed, yet the belt men and machine makers "agree that the machines were properly belted."

It is impossible for me to imagine what kind of belt men and machine makers they are who, after watching a machine come to a complete stop on account of 100 per cent belt slip, will say that the machines are properly belted. If a machine comes to a complete rest, with the driving pulley maintaining full speed, it surely means that the slip is 100 per cent. I know of a case where the driving pulley maintains full speed and the driven pulley does not move at all, but it is on a vertical drive arranged with an idler pulley in such a way that the slip is made 100 per cent purposely.

Much is yet to be learned about leather belts, and for that matter all other kinds of belts. We will never know all that is to be known, but knowledge will be added year after year and improvements will be made just as has been the case in the past.

Soot Blowers in Paper Mills

THE function of the soot blower is to be capable and ready at all times to clean off every particle of soot from the tubes. All the fireman has to do is to turn on the steam and then pull a chain leading to a sprocket valve wheel and the soot cleaner elements are thus rotated and a few seconds of the mighty steam blasts through regular steam turbine nozzles down between the rows of tubes clean them off in fine shape.

The first effect of the clean tubes is to reduce the temperature of the flue gases, and that is just what is wanted. The lower the temperature of the chimney gases the better—the more efficient the boiler.

In selecting a soot blower the trick is to get the kind that reaches every tube most easily and logically. The cleaner elements must be placed in commanding positions. Yet they must not be in places that are so hot as to cause them to burn up in a short time. They must be entirely enclosed within the boiler setting so that the fireman will not have to let in any cold air in order to do the blowing. They must not permit any of the nozzles to direct the steam jets directly against the tubes. Where direct impinging is allowed, serious erosion is liable to occur.

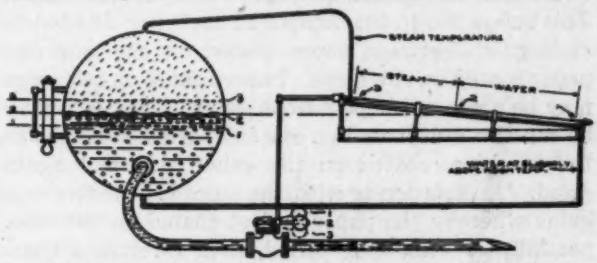
A soot blower is not liable to save so much money per year as can be saved through proper use of a CO_2 recorder, yet they generally lower the fuel bill 5 per cent per year or more, and that is assuredly an important item. Thus if the yearly fuel bill for a given plant is $50,000 per year, the soot cleaner will save approximately $2,500 per year, which will much more than pay for the cleaner.

The fact that large power stations all over the country are installing these soot cleaners as rapidly as the stations are being built is proof that they are an economy factor.

Automatic Control Devices

PROBABLY no automatic device will ever be made to operate so perfectly and be so reliable under all conditions that it will never require any human attention. Nevertheless, it must be admitted that many automatic devices are far more reliable and dependable than any human being in the long run if given a reasonable amount of attention. For example, inventors tried to find the simplest, most direct and positive acting means of filling the demand for efficient and economical boiler feed regulation. One inventor finally declared that the thermostatic principle offers the simplest, safest, most reliable and dependable means of boiler feed control, and he developed a regulator accordingly.

His regulator consists merely of a straight tube, a lever, a heavy iron base, and a balanced valve. The straight tube is placed so that the water level in the tube is somewhere between the ends of the tube. The part that contains water remains comparatively cool, while the part filled with live steam is near the hot steam temperature. The rise and fall of the water



Diagrammatic illustration of regulator connected to boiler

level in the tube corresponds with the rise and fall of the water level in the boiler and decreases or increases the length of the tube exposed to hot steam. The resulting contraction or expansion is transmitted by the lever to the valve which increases or decreases the rate of water flow.

With a fixed amount of water in a boiler, the level will rise or fall with the rate of steam generation. This is because larger and more steam bubbles rise to the surface of the water in a boiler when there is a heavy load. These bubbles cause the water level to rise on account of the increased space they occupy in the water. The thermostatic boiler feed regulator, wherein the water level in the thermostatic tube rises with the water level in the boiler, therefore contracts and cuts down the flow of water when the water level in the boiler suddenly rises on account of a sudden increase in load.

The reverse of the foregoing action takes place when there is a sudden decrease in load. Thus such a regulator temporarily cuts down the rate of feed water supply when the load suddenly increases, and does the reverse when the load suddenly decreases. During constant or slowly changing loads, on the other hand, the rate of feed is always in proportion to the load. This is as it should be.

Drying and Conditioning of Coated and Other Papers

By J. O. ROSS
J. O. Ross Engineering Corp., New York

Paper read before the annual meeting of the Technical Association of the Pulp and Paper Industry, held in New York, April 11, 1923

THE drying of paper is quite intimately concerned with its conditioning and the two are so closely related that it is very often that one process merges into the other. The different classes of processed papers that have to be dried include coated paper, which in its turn includes book paper, lithograph paper, coated boxboard, glazed paper, waterproof papers and similar classes; second, wall paper; third, gum paper; and fourth, sand paper.

Two Main Classes

The drying of coated paper is roughly divided into two main classes, single-coated and double-coated. This refers not to the number of coats per side but to distinguish between paper coated on one side and paper coated on two sides. Paper coated on two sides may be made as single-coated paper. That is it may be run through coated on one side, dried, returned to the machine, coated on the other side and again dried. A variation is with the so-called tandem machine whereby the paper is first coated on one side, partially or completely dried, then receives a coating on the other side after which it is completely dried. For all general purposes, however, by both methods the paper is treated the same as single-coated papers. We will first take up the drying of the single-coated sheet.

The width of the sheet coated may vary from 30 inches or even narrower, up to any width desirable or possible to operate on a coating machine. The writer believes that the gradual tendency will be towards wider coating machines. Seventy-two inches seem to be a popular limit in width at the present time on book and lithograph papers. Machines are now being built a foot wider than this and coating machines have been constructed as wide as 96 inches in width, so far, however, being used on coated board. The writer's opinion is that the only limiting factor on the width of the coated sheet is the handling of the raw stock, the finishing in the calenders and the market requirements for particular grades of stock. The speed of the coating machines is also variable, the limit of which the writer does not believe has yet been even approached.

Maximum Speed

A proper drying system for coated paper should be sufficient to dry the paper thoroughly and properly at the maximum speed at which the color can be applied on the coating machine. Considerable change of opinion has taken place in the last few years as to what this maximum speed is. Not so many years ago 150 feet per minute was considered very fast. From 200 feet to 250 feet is now considered perhaps the maximum for book papers. Coated board machines have operated as high as 350 feet per minute. The only limits to the speed seem, as stated, to be the brushing of the color and the ability to build a machine that will operate at these high speeds mechanically correctly. The proper brushing on of the color has been secured by adding brushes so that today we see machines for coating book paper with as many as nine brushes. This means that the brushes run more slowly than would be the case with a smaller number of brushes.

The old time coating machine which would rack itself to pieces at a speed of 200 feet per minute is gradually passing out of use. Some of these old machines were made with wooden frames and cost as little as $600 or $700. The modern coating machines are constructed of heavy steel and cast iron and built to stand high speeds without excessive vibration. The brushes are operated by high grade machine eccentrics and in general the whole machine is built for high speed and continuous operation. The cost of such coating machines is very much greater than the old type, many of them costing over $6,000. The first cost of a coating machine, however, is such a small proportion of the value of the output of that machine for one year that a saving of a few thousand dollars on the machine at the expense of several feet of speed is a saving that should not be made.

The writer believes that the coating width and speed will gradually increase until speeds far beyond that now believed possible will be in everyday use. What this will mean on labor costs and production is self evident. In one class of the coated paper industry it had been the custom to make a 36 inch sheet, and the coating machines were run at a speed of approximately 175 feet per minute. This same mill is now using a 72 inch machine running at nearly 350 feet per minute, which means that one crew is turning out four times as much paper as it did previously. This not only cuts down labor costs but means a great saving in the size of buildings required.

All this increase in width and speed and consequent tonnage, however, makes the problem of drying all the more important. With the old, slow-

speed, narrow machines the drying problem was not very serious provided a very long line was used, but with the speed doubled it is practically out of the question to give double the length of line. Unless the drying system would dry the paper as fast as the coating machine could turn it out, it would be useless to purchase high speed coating machines and have their ability rendered unavailable by an insufficient drying arrangement.

Two Classes of Driers

There are practically only two classes of driers for coated paper, the flat drier and the festoon. In the early days coated paper was sometimes passed over a cylinder heated by steam but the length of time available by such means for drying is so short that today it is entirely out of the question even without considering the injurious effect of the contact with the heated cylinder. With the flat drier, mostly in use today, the paper is put on to a canvas belt and carried flat, the coating being dried either by blowing warm air against the surface of the paper or by using steam coils under or around the belt. Where it is not possible to loop paper in festoons this is about the only practical method but, in the writer's opinion, it should only be used when this condition exists. The beneficial value of the festoon drier is that it gives a considerable time element for drying in a comparatively short space. It will be readily understood that if a coating machine is running 200 feet per minute and the paper passes on to the belt of a flat drier, if the belt is 200 feet long, the paper would only have one minute to dry. On a festoon system, however, allowing for the paper to hang in festoons not over 6 feet long and with the sticks 12 inches apart, there would be 13 feet of paper in each festoon so that in 200 feet of festoons there would be 2,600 feet of paper, giving a drying time of 13 minutes instead of one minute. This means that the paper can be dried more slowly, a lower temperature used with an important bearing on the condition of the paper.

In a festoon system, the paper after passing from the coating machine is carried on sticks up an inclined elevator and the sticks are then carried along on chains overhead so that the paper hangs in loops, the length of the loops and the distance apart of the sticks being a matter that is varied depending on the class of coated paper. As a general rule, the paper should be carried with the sticks further apart at the beginning of the drying operation, while at the other end on the dead rail where the paper is practically dry they may be grouped very close together. The size and shape of the sticks should be determined according to the class of paper. A small square stick will make marks on paper that would not be at all apparent if a round large stick is used. Stick-turning devices may be used for turning the sticks over at various points along the line so that the paper does not remain in the same position on the sticks throughout the entire travel. The length of line necessary for festooning is determined by the length of time required for drying, which again is absolutely dependent on the method of applying the drying medium and its temperature.

The oldest form of drying coated paper festoons was to string steam coils underneath the loops. The heated air rising from the steam coils warmed the under side of the sheet and caused the coating on the top side to dry, but was far from a satisfactory system. In the first place, the heated air should have been applied to the coated side of the paper instead of the uncoated side, accomplishing very much more efficient results. Another bad feature of this method was that, the heated air striking the back of the paper passed upwards along the edges of the paper, over-drying the edges and causing an unevenly dried sheet, resulting in great trouble on the winders and in the finishing department.

Air Dried Before Entering Room

A good many years ago attempts were made to dry the coated paper by the use of air which had been warmed before entering the room. Such systems have been greatly improved until today the vast majority of coated paper mills operate with this type of air drying system. The air is conducted into the room through metal ducts, carried above the festoons and is discharged downward over the wet coated surface of the sheet so that this surface tends to dry by the circulation of the air as well as by the application of the heat. By bringing most of the air down into the middle of the sheet and by the use of nozzles of a design which was developed after considerable experiment it was found possible to dry the paper uniformly across the width and not overdry the edges. This development was responsible for the widening of the coating machines since previous to that time any attempt to run a very wide sheet resulted in a sheet of paper which was damp in the middle and very much overdried on the edges. The circulation of air downward created a rapid circulation of air around the paper with the result that a very much lower temperature could be used and consequently a great improvement in the quality of the paper. As the circulation of air was entirely artificially produced less change was noticed in the air condition of the coating room under varying weather conditions than was otherwise customary. Previously with steam coils on damp, still days, the circulation of air through the dry room was very slow and entering air was laden with moisture so that the drying was much retarded during such weather. It was also noticed that while such a room seemed to dry the paper very well in the early morning it would become hotter through the day as the atmosphere in the room became laden with moisture while the drying was retarded but the air drying system overcame that condition. By this system the air is removed from the room at the floor, part of

the air carrying excess moisture being discharged to the atmosphere, and part being recirculated performing two valuable duties. One is the saving of steam required compared with heating outside air entirely and the other the preservation of a certain degree of humidity in the room, which greatly improves the quality of the sheet. The removal of the steam coils from the floor aided in keeping the room clean and free from dust and it was also found that whereas with the steam coil system the steam had to be turned on many hours before the beginning of operations, with the air system it was necessary to start it up only a few minutes before starting the coating machines. This system, until a few years ago, seemed to be the best that could be accomplished and was one that would dry the paper as fast as the coating machine could produce it, and dry it uniformly across the sheet and in fact was a very satisfactory system.

Double-Coated Paper

Before going on to the improvements and changes it might be well to touch on the double-coated paper.

On double-coating machines the paper is passed through two sets of brushes which apply the wet color on both sides. This method was a great improvement over the tandem machines or coating in two operations, and meant a great increase in tonnage per crew, but led to a great many difficulties in the drying. The paper, before festooning, had at least to be partially dried and had to be dry enough on the underside so it would not scratch by touching any surface. This necessity led to the development of the so-called "floater." The paper, after passing out of the coating machine, passed over this floater, which consists of a series of metal ducts and nozzles by which jets of air support the paper for a distance of approximately 100 feet until it is dry enough to go on to a suction apron and afterwards be festooned. By heating these jets of air which floated the paper, the under side was dried, as well as supported, so that the finished drying of the upper side could be done in the festoons, as in the case of single-coated paper. It will be understood that the development of the floater was a long, slow process, but it has gradually been improved until it is now perfectly feasible to float paper and dry it on the under side. Much care must be exercised in the design of the floater, in the connections to the fans and the method of applying the air. The least eddy current in the air jet from a nozzle will make it impossible to float the sheet. The air for the floater is usually heated to a very much higher temperature than the air for the festoon end. This is due to the fact that the paper is very wet as it leaves the coating machine where the floater is used, and the evaporation of the moisture produces a cooling effect which prevents the sheet from being injured. Part of the air is discharged and part recirculated as in the single-coated paper driers.

The air drying systems both on the single- and double-coated papers were gradually improved until they seemed to produce as good a sheet of coated paper as was possible, and to dry it as fast as the coating machine would produce it. The length of lines was shortened up very materially as more and more air was applied in the circulation. It was also found that by increasing the temperature of the air the paper could be dried in much shorter lines. The development usually meant enclosing the drying lines in tunnels thereby not only keeping the heat in contact with the paper but preventing its escape into the working space of the room. It is entirely possible to dry coated paper in a very short time as high temperature does not injure the paper except at the end of the process when the paper is nearly dry. If, therefore, the paper is kept continuously running through the machines and the drier so adjusted that the paper will be at the right degree of dryness at the dry end, no trouble will be encountered. This, however, is quite difficult to do, but it is entirely possible to dry paper in festoon lines considerably less than 100 feet long but only by using a comparatively high temperature. If the lines of paper are stopped for any length of time, however, trouble is encountered. In changing the roll of paper or any of the numerous cases where it is desirable to stop the festoon lines for a time which may be from one minute to fifteen minutes, the high temperature used on the short lines will dry the paper bone dry, making a sheet not only difficult to handle in the finishing room but one giving trouble in the press rooms.

About this time considerable attention was given to troubles in the lithograph press rooms. They were especially found in press rooms using multi-color presses where one color would be applied one day, another color the following day, etc. In damp weather, especially in summer when the press room was very humid, paper might be received from the coating mill altogether too dry. It would pass through the press taking the first color impression. On the second day it would be found that the paper had slightly expanded and the second color impression would not go on in the same exact location in relation to the first. This is what is called "change in register" and is a very serious difficulty to pressroom operators. Some days it would be almost impossible to run any sort of high grade lithographs through a press room. This brought up the subject of air conditioning so that there might be a constant temperature and humidity in the press room. Two troubles were encountered at once. The first was the prohibitive cost of accomplishing just that result. There was no trouble in winter when moisture had to be added to the air but in summer when the air had to be dehumidified to remove some of its moisture elaborate systems with ice machines were installed. Tests were made and it was discovered that

even an absolutely uniform temperature and humidity in the press room would not cure the troubles. This was due to the fact that the paper came from the coating mill in a varying moisture condition. It will be seen that if a coating festoon has been stopped for five minutes the paper in the festoon would be bone dry and then the machine would start up. In the same ream of paper might be a certain number of sheets bone dry, others at the proper moisture content, and if the drying system was not quite ample there might be some which were too wet. In addition to this situation it was found that during the winter the average coating mill was turning out paper which was a little drier than necessary, due to the fact that the entire mill had a very dry atmosphere from the artificial heat used. In the summer time it was probably a little too damp. If this overdry paper made in the winter went to the press room and the press room was artificially humidified, the same trouble with change in register would be encountered as had been experienced before the press room had been properly conditioned. Bringing a stack of paper into a press room which was properly conditioned, would not change the moisture condition of any part of that paper except at the edges and the top sheet. It was found necessary to hang up the sheets individually if the paper was to be brought to the proper condition.

At this time it should be understood that paper will come to a certain percentage of moisture content depending on the humidity in the atmosphere surrounding the paper. In other words, with a certain temperature and humidity, a sheet of coated paper will dry down until it contains 4 per cent moisture. If the temperature be increased and the humidity decreased in the surrounding atmosphere, this paper will then dry down to 2 per cent and remain stationary. If, however, the temperature be decreased and the humidity increased the paper which had 4 per cent moisture will begin to absorb moisture until it contains 6 per cent and will then remain constant. This means that paper can be brought to any percentage of moisture content if the atmosphere surrounding that sheet is at the proper humidity. It was found that paper containing about 6 per cent moisture did not change very rapidly in a press room even if the atmosphere in the press room varied considerably. The mean average seemed to be about 6 per cent. It seemed, therefore, that if paper could be secured with 6 per cent moisture content uniformly in every sheet in the press room less trouble would be encountered. This was done at first by hanging individual sheets of paper up in a lithograph plant, which was a very expensive proposition from a labor standpoint. The next move was on the part of the coating mills to secure the same results. Bearing in mind that paper will reach a fixed moisture content depending on the humidity of the atmosphere surrounding it, one of the coating mills installed a conditioning system on the end of its drying line. This was done by enclosing a section at the end of the drying line and circulating air at a predetermined temperature and humidity. This air was designed to secure 6 per cent moisture content in the paper. Any paper wetter than this would give up moisture and any paper that was drier would absorb moisture. This system was very successful and has been installed by several coating mills. If the paper is dried to 6 per cent in the lines it will pass through a conditioning tunnel without any change in moisture content. If, however, the lines are stopped and the paper in the drying lines becomes too dry, as soon as the line is started up this paper passes through the conditioning tunnel and reabsorbs sufficient moisture to bring it back to approximately 6 per cent. The same thing occurs when the paper enters the conditioning tunnel in a condition which is too wet. It will then continue to give up moisture until it comes to approximately 6 per cent. This meant that the lithograph manufacturers could now get paper which was practically uniform in all weathers and the conditioning of the press rooms was a much simpler and easier problem. It was not necessary to get the press room to exact conditions but only to secure those approximately uniform so that the paper would not change too greatly. It is also possible for this conditioning system to turn out paper with a little less moisture content in winter and a little more moisture content in summer, with the result that the press room could be carried with a higher humidity in summer than in winter, greatly simplifying the air conditioning problem. With this air conditioning system it is now possible to run very much higher temperatures in the drying lines with a consequent greater speed of drying without the danger of every little change in coating or stock or speed affecting the final moisture of the sheet. The conditioning system has proved to be a balance wheel on the drying system and seems to be a logical development.

Wall Paper

In the drying of wall paper it should be handled very much as a single-coated paper. The paper is run through what is called a "grounder" machine which is simply a coating machine. The paper then passes down over one set of festoons and is dried and then passes through the printing machine which prints the design on the background. It then passes over another set of festoons which dry the ink. This printed festoon is usually placed directly above the "ground" festoon. Wall paper has a lighter coat and is much more quickly dried than coated paper. It is not so important to have a fixed moisture content as the printing is done instantaneously. It is therefore entirely practical to dry it with a higher temperature and faster than coated paper and the conditioning system does not seem to be necessary. By using a high temperature it is entirely possible

to dry wall paper in lines comparatively short but it is necessary to make sure that the paper is not allowed to hang in the lines longer than it should or a brittle, dry sheet which will give trouble on the rollers will be the result. Wall paper is sometimes dried on flat belts and by using high temperatures has been dried in as short as one-half minute. The widths of wall paper is very much narrower than any coated paper and the whole problem is much easier.

Waterproof and Glazed Paper

Waterproof paper and glazed paper is usually handled very similar to single-coated papers and really enters the same class. The moisture content feature is not important on this, except in isolated cases. The length of lines and the amount of circulation of air is almost entirely dependent on the coating applied.

Gummed Paper

Gummed paper divides into several classes, depending on whether fish glue, animal glue or dextrine is used. These differences determine to a considerable extent the design of a drying system as to quantity and temperatures but are mostly treated in the same way as far as the type of system is concerned and can be treated in this article as one. After the paper passes through the gumming machine, the most common form of drier was the so-called Crowell or scroll drier. The paper in this case passed over a frame drum or over a scroll whereby it was kept under tension and exposed to hot air and finally wound up in the center of the scroll. Gummed paper has a tendency to curl badly on the edges and it was felt that by keeping it under tension this tendency to curl was overcome as much as possible. It was recognized that the longer the distance the paper traveled, and the lower the temperature used on the paper, the better. Of late, however, gummed paper is being more and more festooned and dried very similarly to coated paper. The conditioning system has proved especially valuable on gummed paper because the limit of speed of gumming and drying soon got to be higher than the speed of reeling. The speed of reeling the paper depended greatly on the amount of curl on the edges. By putting the gummed paper through a conditioned air system, the edges which were too dry reabsorbed some moisture and tended to straighten out. Formerly it was usual to put jets of steam on the edges of the gummed paper hanging in the festoons before passing to the reel. This added moisture but also added heat and there was no control over it. It was very easily possible to put too much moisture on the gummed paper with the result that it would be sticky and if reeled up in this condition the results were very serious. It was at first thought very radical to attempt to put moist air on gummed paper which it was feared would become sticky but it should be borne in mind that conditioned air, while moist, has no free moisture, which is the great advantage it has over the steam-jet method of humidifying. Therefore, the paper does not come in contact with any drops of moisture but only absorbs the amount of moisture that it was predetermined it should.

Sand Paper and Similar Products

Sand paper, emery paper and similar products range all the way from paper covered by very fine sand, such as used for polishing furniture, up to the type of paper used on grinders with very coarse grits. This class of product also is festooned but requires a very much longer time to dry than coated paper. Formerly it was considered that a sand paper machine should run until the room was entirely filled with festoons of paper and then allowed to stand over night until the roomful became dry. With modern air drying systems it has been found possible to keep operating the machine and drying it as fast as it comes from the machine. It is necessary, however, to have lines as long as 500 feet or over. It is necessary to use a low temperature on account of the glue that is used and this greatly retards the speed of drying. In the case of this drying, however, it was found best to discharge the warm air upward underneath the loops of paper. The moisture in the glue and size seems to strike through the paper and the sand on the surface seals the surface and prevents the evaporation of moisture from the upper side as it does in coated paper. Great trouble is encountered with the curl of the edges in sand paper and at the present time it is the usual custom to use steam jets for "breaking down" the edges. By discharging the air upward more in the middle than on the edges, however, considerable of this trouble is obviated and a much more uniformly dried sheet is secured.

Conclusion

In closing this article it should be borne in mind that all of these systems should be designed only after a thorough knowledge of the problem and that slight changes in the coating or speeds or widths must be carefully determined in the design. The question of moisture content and change of register of paper is one that is becoming more and more important. It is becoming recognized that it is not sufficient to give a sheet of paper which has the proper strength and the proper surface and proper formation, but it also must have the proper moisture content.

There are many ways to cut costs and improve conditions at the same time, if we will only stop and look around. In one mill, where they had a rather dark stairway, and where a big light had been consuming power for a number of years, a coat of white paint was applied, with the result that it was not necessary thereafter to use the light, and the power cost was saved, while the whole surroundings looked better and were more cheerful.

First Paper Industries Exposition

Held in the Grand Central Palace, New York City, April 9th to 14th, 1923

(By Special Correspondent)

EVERY booth on the fourth floor of the Grand Central Palace, at New York City, was filled. Manufacturers of paper who were not exhibitors this year were heard on every side planning to have their wares shown next year, and more than one man predicted that the next exposition would require the entire building, instead of just one floor.

And apropos of this, there was a feeling that while this exposition was aimed only at the paper manufacturers and jobbers the next one should—and probably would—include more exhibits of interest to the layman, or consumer. There were many women visitors, especially during the evenings, who spent much of their time at the booths where paper accessories for the kitchen were displayed.

Representatives of publishing houses were seen making the rounds and collecting samples of paper and bristol board, especially in colors, for their files. Several of these were heard to comment on the small number of exhibits of paper. Inasmuch as they made their comments to the men in charge of the booths, it is safe to assume that the paper manufacturers are keeping an ear to the ground, with the object of incorporating suitable suggestions in their plans for next year's exposition.

Mr. Charles F. Roth, who managed the affair, was on the floor at all times, and the International Exposition Company did everything in its power to make the affair successful.

A Little Visit to Each Exhibit

Booths 37-38. The American Writing Paper Co., Holyoke, Mass., did not send its miniature paper machine to the Exposition, much to the disappointment of some of the visitors who are not familiar with the processes of manufacturing paper. They had a very interesting advance showing of an advertising campaign, with printed speciments of all their papers. This campaign is planned to give every possible help to printers, in the sale both of printing and papers.

On the back wall of these booths was a composite picture of the American Writing Paper Company's twenty-six mills. Desk libraries showed complete sets of samples of all their printing papers, as well as the handbook of quality standard papers. There was always a large group of printers, publishers and jobbers at this exhibit.

Booths 143-144. The American Manufacturing Co., of Brooklyn, N. Y., used very effectively for a background for their display, a colored painting of their plant, measuring probably eight by twenty feet. Above this a permanent looking sign bore their name in letters of gold on a black ground. This was an especially well planned display and deserves honorable mention.

A two hundred fathom coil of transmission rope weighing seven hundred pounds, received much attention from paper men, as did other coils showing one hundred stranded ends in fifty and one hundred pound sizes. Manila, hemp, sisal and Tampico hemp were arranged, in various coils and balls, on the railing surrounding the booths, where they could be conveniently examined by visitors. (See Ill. No. 9.)

Booth 91. H. Reeve Angel & Co., of New York City, agents who sell paper only to jobbers and publishers, offered for inspection hand tooled leather sample books, showing hand made papers that included drawing, filter, note and printing. They also had samples of newsprint, wrapping, cigarette, and stereo tissue. Wicker chairs arranged around a table, invited the visitor to come in and be comfortable.

Booths 161-162. A group of eight felt manufacturers combined their displays in these two booths. They were, **The Albany Felt Co.,** of New York City; **The Appleton Woolen Mills,** Appleton, Wis.; **Draper Bros. Co.,** Canton, Mass.; **F. C. Huyck & Sons,** Albany, N. Y.; **Knox Woolen Co.,** Camden, Me.; **Lockport Felt Co.,** Newfane, N. Y.; **Schuler & Benninghofen,** Hamilton, Ohio, and **Waterbury Felt Co.,** Skaneateles Falls, N. Y.

Each of these mills had one complete felt displayed on the counter in front of the booth, which was directly opposite the elevator. The lovely fleecy felts seemed to fascinate the women, who were all disappointed that they could not be purchased for blankets.

On the back of the booth was shown a complete fleece just as it comes from the sheep's back, next the wool was shown after sorting and scouring, and in other panels, wool was shown after the various carding and spinning operations. There were three squares of woven felt shown—one as it is loosely woven, the next after it has been shrunk, and the third with the nap raised. This was a most interesting and well arranged exhibit. (See Ill. No. 8.)

Booth 59. A. W. Archer & Co., Inc. of New York, agents who sell only to jobbers, used a blue velvet cabinet as a background for an assortment of colored cotton twines and cotton braided sash cord. On the railing of the booth was Sea Island twine, cable laid and wrapped in cones, some of them in cone holders. This was one of the colorful exhibits that stood out pleasantly from a background of machinery.

Booth 129. The Armstrong Machine Works, of Three Rivers, Mich., had a steam trap in operation. Many of the parts were built of glass so that the visitor could be shown exactly how water, air, and other non-condensable gases are removed by this steam trap from the driers of the paper machine. The display included metal traps of the various sizes used on paper machines. (See Ill. No. 15.)

Booth 57. American Paper Forming Co., Kenilworth, N. J., showed three styles of paper plates tacked in designs onto the back well of their booth. This company is only a year old, but from the quality of their wares—which are made of wood pulp and not old papers,—ought to experience exceeding prosperity.

Booths 106-107. These two booths were turned into lounging room and the wall carried a sign reading "The Paper Machine Wire Manufacturers Industrial Council." The following were also registered on the Exposition's books, against these numbers: **Appleton Wire Works, Inc.,** Appleton, Wis.; **Buchanan & Bolt Wire Co.,** Holyoke, Mass.; **Wm. Cabble Excelsior Wire Mfg. Co.,** Brooklyn, N. Y.; **Cheney Bigelow Wire Works,** Springfield, Mass.; **Eastwood Wire Mfg. Co.,** Belleville, N. J.; **Lindsay Wire Weaving Co.,** Cleveland, Ohio; **Jos. O'Neill Wire Works,** Port Chester, N. Y.; **W. S. Tyler Co.,** Cleveland, Ohio; and **Wisconsin Wire Works,** Appleton, Wis. The two booths contained plenty of comfortable chairs, settees and a table, for which many a tired visitor gave mental thanks.

Booths 69-70-77-78. The Bagley & Sewall Co., Watertown, N. Y., had on display the newest developments in items of paper mill machinery. Due to the bulk of their machinery, and the restrictions as to the weight per square foot the floor would carry, not all of the machinery they intended to show was there. They had, however, a new slide bar, higher than the old type, for use on high speed machines; a fourteen foot drier, with a diameter of sixty inches, bored inside, which they claim is the largest made, the improvements being the grinding of the journals and their gear fit, as well as the new method of discharging air. There was a brass covered felt roll, which they expect will replace the old iron rolls. A huge ball bearing guide roll, on display, was already sold to the Three Rivers International Paper Company. All of the machinery on display was made for various paper companies, and are regular stock items, which will be shipped to the purchasers at the close of the Exposition. (See Ill. No. 2.)

Booth 159. Richard Bauer, a New York City jobber, showed samples of sulphite papers from tissue to board, arranged on the wall of this booth in the colors of the spectrum. Printed signs proclaimed that he could provide papers to fit any requirement.

Booths 7-8. The Bird Machine Co., South Walpole, Mass., and the Ingersoll Rand Co., of Montreal, were exhibiting together. They showed a Bird Screen, a Bird Save-All and a Bird Self-Cleansing Shower Pipe, the latter in operation. The Screen on exhibition has been sold to the Continental Paper Co., Bogota, N. J., and is the seventh made for them, completing the installation of screens on their one hundred ton board machine. The Save-All has also been sold. (See Ill. No. 26.)

Booth 71. Booth Chemical Co., Elizabeth, N. J. A full size dry feeder for feeding alum or other chemicals used for water purification, or paper and pulp recovery, was shown in operation, together with glass containers holding the various powdered chemicals.

Booth 55. The Bristol Co., Waterbury, Conn. Eleven different types of recording instruments used in the paper industry were displayed to advantage on a green covered collapsible background. The only one in operation was a model

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HERCULES WOOD ROSIN
AMERICAN MANUFACTURING CO
Nash Engineering Co

of a tachometer. Instruments of this sort are always interesting, and this booth was crowded most of the time.

Booth 132. The Beloit Iron Works, Beloit, Wis., showed a roll of newsprint made at 1100 feet per minute by the Consolidated Water Power & Paper Company, of Wisconsin Rapids, Wis. The wall of this booth was covered with photographs showing sections of paper machines, made by the Beloit Iron Works. (See Ill. No. 22.)

Booth 25. Alfred Bleyer & Co., Brooklyn, N. Y. Used two bright colored paintings, showing social affairs where their paper plates were in use. This company manufactures an especially nice printed "china-like" plate paper from coated stock, which attracted attention at their booth. Their display also contained sick room packages, bags, cake boards and paper dishes.

Booth 96. Cameron Machine Co., Brooklyn, N. Y., had a Type 6 slitter and rewinder hooked up with electricity, and in operation. Small rolls of paper were cut to show the work of their machine. The exhibit included various products rewound and cut on this machine, from sheer tissue to heavy board. Photos of various machines were displayed. (See Ill. No. 13.)

Booth 146. The Cayuga Linen & Cotton Mills, Inc., of Auburn, N. Y., who are manufacturers of twines, cordage and ropes, lined the railing and background of their booth with balls of twine and cordage in all colors and materials. This booth was crowded, and to the observer it seemed that no two of the balls of twine in the display were alike, which would indicate a large line.

Booths 122-123. The Carthage Machine Co., Carthage, N. Y., manufacturers of paper and pulp mill machinery, showed a pulp and paper shredder, a Y-valve for digester in sulphite mill, a gate valve for stock line, a safety chipper box, a small model of their new improved chipper spout and models of the standard chipper. They also had illustrations of their machines. (See Ill. No. 18.)

Booth 58. Continental Paper & Bag Mills, New York City, against a blue velvet background showed samples of the bags, envelopes, sacks, wrappings and glassine papers made by their eleven mills. Many of these items were printed at their plant at Rumford Falls, Maine, which they claim is the largest printing plant in the world. This was an unusual and well arranged display.

Booth 113. Cooper & Cooper, Inc., New York City, importers and manufacturers' agents, had in glass containers sodium sulphate, salt cake and china clay. There were also interesting photographs of a Utah mine.

Booths 23-24. The Dendro Co., New York City, showed two stumps of pine trees, one turpentined by the old method of cutting a deep gash in the bottom of the stump in which the turpentine could gather, and the other equipped with an improved Herty cut for catching the turpentine. The resinous chips of the pine trees, and all the by-products obtained from them, were on display, including three samples of artificial silk. The statement was made here that the stumps of pine trees standing in the South, would provide by-products to the value of fifty dollars for every cord of these stumps cut. A most interesting educational display.

Booths 12-13. The Dorr Co., New York City, showed a Dorr Tray Clarifier, a new type of save-all which recovers fibers from white water entirely by settlement. There are no screens. The fibers are allowed to settle, and the clear white water overflows the tank. The machine was in operation, operated by electricity. Pictures were used to illustrate the work.

Booth 125. The Duriron Co., Inc., Dayton, Ohio, had a diagrammatic layout of an alum dissolving system, showing the application of Duriron acid proof equipment. In the booth was a Duriron valve used on an alum line for 3 years. (No. 19.)

Booths 150-151. The Electric Bleaching Gas Co., of New York City, alive to the psychology of showing machinery in operation, installed a complete working model of a bleach mixing plant using liquid chlorine. These plants are installed in more than thirty mills in this country and Canada. Two were sold on the first day of the Exposition, at the booths. The building of these plants is an incidental in their business, which is the sale of liquid chlorine, and all installations are made at cost.

Booth 21. Endura Mfg. Co., Philadelphia, Pa., converters showed samples of automobile and other machinery packing made of rope stock paper, chemically treated, so as to resist oil and water, even brines and acidulous waters. Gaskets were most effectively mounted on a bright green felt, on the wall of the booth.

Booth 5. The Enterprise Machine Co., Middletown, Ohio, showed a Brooks Patented Quick Opening Gate Valve for stuff lines.

Booth 95. The Farnsworth Co., Norristown, Pa., exhibited a full size condensation pump, and on their wall, drawings of the newest machinery for drawing condensation from drier rolls. (See Ill. No. 24.)

Booth 54. The Feculose Company of America, Ayer, Mass., had samples of coated paper in which Feculose was used, including bond and ledger papers which were tub sized with Feculose, and offset paper which was surface sized. Feculose is a partial starch acetate and can be used in place of glue and casein in manufacturing and coating of papers.

Booth 76. The Foreign Paper Mills, New York City, displayed Schopper World Standard Scientific Paper Testers, Schopper Strength and Stretch Tester, Schopper Folding Endurance Tester, a portable rapid strength and stretch tester, paper scales, micrometers, pulp testers and opacity testers. This concern makes nothing but paper testing instruments.

Booth 9. Frederick Iron & Steel Co., Frederick, Md., exhibited a full size rotary positive displacement vacuum pump for use on flat boxes and suction rolls of paper machines; a centrifugal pump for handling pulped paper stock, and a small model of the vacuum pump.

Booth 148. Forest Paper Co., Inc., New York City jobbers, show everything in the line of paper that printers require, including book, bond, ledger, coated, blotting, bristols, onion skins and envelopes. On a background of soft green cover stock, various colored samples of their lines appeared.

Booth 90. Gibbs-Brower Co., New York City, paper and pulp mill brokers, had an interesting map showing the location of all the paper and board mills in United States and Canada, their shipping locations and daily production capacity. This booth was arranged for lounging, and was presided over by a pretty girl, usually busy at a typewriter. (No. 4.)

Booth 94. Great Western Mfg. Co., Leavenworth, Kansas, displayed a Combs Gyratory Screening Machine used for screening clay fillers, milk size and colored coating batches, before these materials are put into the beaters. This machine was electrically driven by a one-sixth (1/6) h. p. motor and could be speeded to 860 gyrations per minute.

Booth 130. The Burney Ball Bearing Co., Jamestown, N. Y., show a very large motor driven ball bearing, revolving and turning at the same time, and a sign, bearing the name Burney make of ball bearings. A worm drive reduction unit equipped with Burney ball bearings, was also shown. (No. 14.)

Booths 18-19-20. The Hammermill Paper Co., Erie, Pa., walked away with the honors, as far as the beauty of their exhibit was concerned. Their display of paper, some of it converted into envelopes and stationery, was colorful and well lighted, and always was the center of a group of paper men and visitors. The announcement and first showing of a new half-tone finish, high calendered sheet, which will replace to a certain extent the antique finish sheet they have sold for half tone work, was made at the Paper Exposition.

Part of this display consisted of twenty-five illuminated pictures, showing every step in the manufacture of paper. This was one of the few exhibits planned to catch the attention of the layman. (See Ill. No. 25.)

Combined with this exhibit, which occupied three booths, were the holiday lines of good bond papers, converted by the White & Wyckoff Mfg. Co., of Holyoke, Mass. P. P. Kellogg & Co., of Springfield, Mass., were also represented here.

Booth 127. William A. Hardy & Sons Co., Fitchburg, Mass., exhibited a screen cylinder for a Bird Machine, and a Walpole screen. Here also were a ten inch bronze blow off valve as used on digesters in sulphite mills, and several full size flat bronze screen plates, beautifully polished. A comment on the beautiful finish brought out the fact that these are part of an order not scheduled for shipment immediately, and were taken out of stock for the Exposition. (See Ill. No. 6.)

Booth 155. Hercules Powder Co., Wilmington, Del., showed in glass containers resinous chips and the by-products secured therefrom. The main exhibit here was a large block of wood rosin. There were also Indurated Fiber ware vases and trays, for which wood rosin was used in finishing. Booklets were provided containing papers sized with Hercules wood rosin. The back of the booth was curtained with green velvet, above which a red velvet valance bore the name Hercules in gold braid. (See Ill. No. 7.)

Booth 93. Hermetite Chemical Corp., New York City, tested for visitors their product—Hermetite—which is a white transparent liquid, used for waterproofing paper and cotton goods. A sheet of thin tissue, coated with Hermetite, entirely covered a dish of boiling water, and to prove that no moisture came through the waterproofed sheet, matches were left in the sheet during the test, and were lighted to prove that no moisture came through. This is a new process, as far as paper is concerned.

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BURNER
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THE DORR COMPANY
ALUM
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SANDUSKY FOUNDRY & MACHINE CO.
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Booth 53. Herrman Paper Co., New York City, had various paper scales, board scales, and gauges in operation.

Booth 145. Individual Drinking Cup Co., Easton, Pa. A pretty girl in this booth offered to the public drinking water in paper cups, and this was appreciated, for there seemed to be no other place on the floor to obtain drinking water.

Dispensers and penny venders for paper cups, soda cup holders and sundae dishes were used in the display. This booth also had a technical display of microscope and fibers used in making cups. A vote of thanks ought to be tendered to this company for providing drinking water.

Booth 22. The Industrial and Education Press, of Gardenvale, Quebec, covered their wall with placards bearing the names of their publications, of which The Pulp & Paper Magazine of Canada is one.

Booth 60. Japen Paper Co., New York City. Chinese, Japanese, English, Italian, French, Swedish and Spanish hand made papers—exquisite papers beautifully printed, were shown here. There was a set of six beautiful posters, showing the use of hand made colored papers for poster work. Surely there can be no more beautiful papers than these!

Booth 128. Jeffrey Mfg. Co., Columbus, Ohio, had sections of chain for elevating and conveying service for handling pulp wood, chips, and ashes, and for power house equipment. There was belt conveyor equipment, and photographs of installations. (See Ill. No. 1.)

Booth 15. G. D. Jenssen Co., New York City, make a feltless wet machine for manufacturing pulp. This is a Swedish invention newly introduced here. Here also was a Jenssen Tower Acid System, for producing acid for sulphite mills. Photographs, maps and a plan drawing of a cooler for gas, were on the wall. (See Ill. No. 31.)

Booth 105. Kalbfleisch Corp., New York City. This booth was luxuriously equipped with gray velvet divan and chairs, mahogany furniture, and even a floor lamp! The Higman Clays for coating and filling, both domestic and imported, were displayed in crude, washed and refined, and pulverized forms. Colored and white materials in glass containers, alternated in this display. (See Ill. No. 29.)

Booth 121. The Keystone Lubricating Co., Philadelphia, Pa., showed their latest invention, a Keystone Manifold Safety Lubricator. This consisted of a steel cylinder, with a threaded piston rod in it. At the end of the cylinder is a manifold distributor from which twenty or more pipes lead to various bearings to be lubricated. They showed a new lubricant that remains in its original state even in temperature up to 400 degrees F. They have a hot plate in the booth to prove it. A drop of water boils off the plate, while a drop of grease remains intact. On the wall of this booth, the word Keystone was spelled out in quarter inch tubing, through which grease was forced by the new safety lubricator. (See Ill. No. 16.)

Booth 158. John Lackner Co., of Long Island City, New York, manufacturer of paper cups and dishes for hotel use, and of a very large line of crepe paper novelties and decorations, showed at the Exposition only such items as jobbers could conveniently handle. A vase, covered with braided crimson crepe paper, holding crepe paper roses, was the only display from the novelty lines. The paper dishes showed up well against a dark blue satin background.

Booth 10. The Layne & Bowler Co., Memphis, Tenn., had in operation a model of a Layne deep well turbine pump and a half section of a gravel wall well, closed off with glass, so that the work of the pump could be seen. (See Ill. No. 3.)

Booth 35. The J. P. Lewis Co., Beaver Falls, Pa., manufacturers of paper plates, folding boxes, silverware boxes especially made so silver will not tarnish, talcum cans, electric insulators and milk bottle caps had samples of these on display. Colored bristols were well arranged on the wall, and perched above the color display was a stuffed beaver, a replica of the company's trade mark.

Booth 124. Lead-Lined Iron Pipe Co., Wakefield, Mass., showed samples and cross sections of their lead-lined pipe.

Booth 114. Mathieson Alkali Works, Inc., New York City, showed a model of system for preparing bleach liquor from liquid chlorine, a ton container for liquid chlorine with a section of one end removed, and glass jars filled with bleaching powder, soda ash, caustic, etc. (See Ill. No. 12.)

Booths 135-136-154. Nash Engineering Co., South Norwalk, Conn., had in operation a new Jennings flat box pump, motor driven through a new style short center belt drive, arranged with venturi meter and instruments to measure exact capacity and horse power requirements, sufficient to handle flat boxes on a 140 Fourdrinier machine maintaining up to ten inches of vacuum on the flat boxes and discharging the white water against twenty feet of head. It takes less than 25 h. p. to do this. (See Ill. No. 10.)

There was also a solid bronze pump built for the Paraffin Companies on the Pacific Coast, a Nash pump taken apart, and a turbine driven drier exhaust unit. This exhibit was always surrounded by paper men.

Booth 54. National Machine Tool Co., Boston, shared this booth with the Feculose Co. Self lubricating bronze bearings containing tapered graphite plugs, or inserts which supply the lubrication without use of oil or grease, were the features of this display.

Booth 76. National City Paper Corp., New York City, shared this booth with the Foreign Paper Mills, and displayed samples of cover, bond and parchment papers. (No. 30.)

Booth 17. New York City Public Library showed samples of experiments they have made in providing protection for wood pulp papers which are being constantly handled. The only practical method that they have found in several years of experimenting, is to cover both sides of each sheet with Japanese tissue. To do this, the file of newspapers, or the book, must be taken apart, a sheet of tissue pasted to each side, and then a new binding must be put on. The print can be read with ease through the Japanese tissue.

In protecting old manuscripts of great value, silk chiffon is used for the protective coating.

Booth 14. The New York State College of Forestry, Syracuse, N. Y., provided illuminated pictures showing reforestation projects. Plants growing in boxes of earth showed the rate of growth of trees needed by the paper industry. Here were eight coniferous trees growing in tubs. Charts showed the present timber supply as compared with our original stand of trees.

Booth 156. The Norma Company, Long Island City, N. Y., displayed ball bearings from five millimeters to 25 millimeters in bore, roller bearings from seventeen millimeters to four inches in bore, and a minimeter for making very accurate measurements, even up to one ten thousandth of an inch.

Booth 11. Oliver Continuous Filter Co., New York City. A small commercial size filter for thickening pulp before bleaching, was in operation. (See Ill. No. 31.)

Booths 39 and 40. Paper Makers' Chemical Co., Holyoke, Mass., had a small rosin refining plant, a small rosin size digester, two miniature emulsifying systems, two miniature beaters, a miniature felt washer, all in operation. They also had a display of the chemicals they produce.

Booth 41. Paper Makers' Importing Co., Easton, Pa. Samples of various clays used in coating and filling paper. C. K. Williams & Co., Easton, Pa., shared this booth, and displayed in glass containers many different kinds of iron oxides, dry colors, and fillers.

Booth 92. PeQuot Mfg. Corp., Long Island City, N. Y., makers of corrugated fiber shipping cases, showed their wares in connection with an Opp sealing machine, which was in operation.

Booths 152, 163, 160, 56, 89 were occupied by the various business papers of the paper industry, namely, **American Paper Merchant, The Paper Industry, Paper Mill and Wood Pulp News, Paper Trade Journal**, and the various publications of **Walden Sons & Mott, Inc.**

Booth 72. Purity Vessels Company, Baltimore, Md., exhibited a large line of paper containers from quarter pints to two quarts sizes. This display appealed to the women visitors and many of them voluntarily expressed themselves as willing to co-operate in any way possible, in the work of teaching the public the value of one-trip milk bottles.

This company makes a bottle that will stand up under automatic filling, which has been a mooted point in the objections offered by the creameries to using paper bottles.

Booths 51-52. Plymouth Cordage Co., North Plymouth, Mass., supplied one of the most interesting of the films shown at the Exposition, tracing the story of rope from beginning to end. In their booths were a 1200 pound coil of manila hemp transmission rope, and a pyramid built of manila cords, commercial twines and bundling products. This was one of the few exhibits that was not all cluttered up.

Booth 153. Pennsylvania Salt Mfg. Co., Philadelphia, Pa. The display was built around a one hundred pound weight cast from iron free sulphate of alumina, containing seventeen pounds of aluminum oxide, by way of illustrating proper percentage. Liquid chlorine in 100 pound cylinders and bleaching powder in a 725 pound drum were also shown.

Booth 140. J. O. Ross Engineering Corp., New York City, and Ross Engineering of Canada, Limited, shared this booth, and showed a model of an economizer to reclaim waste heat from the paper machine. The machine was in operation, driven by electricity. (See Ill. No. 28.)

HAMMERMILL
BOND
BIRD MACHINE COMPANY
G. D. JENSSEN COMPANY
200 Fifth Ave NEW YORK

Booth 133. Ryther & Pringle Co., Carthage, N. Y., had large photographs of Wolf Cooler Installation, Wolf Relief Cooler, Arpeko Chip Screen, and Arpeko Pulp Shredder. There were no models or machines. (See Ill. No. 23.)

Booths 108-109. SKF Industries, Inc., New York City, supervising the Shayef Ball Bearing Co., of Hartford, Conn., and the Hess-Bright Ball Bearing Co., Philadelphia, Pa., which exhibited together. A machine was installed here to show the elasticity of the Atlas Steel Balls. A disc of steel, on which the ball was dropped, was operated by machinery to keep the balls in motion. (See Ill. No. 17.)

Booths 110-111-112. Sandusky Foundry and Machine Co., Sandusky, Ohio, showed huge bronze castings and rolls, including a Milspaugh shower pipe, fluid compressed hard bronze shell wire and felt rolls finished machined, a 25 inch suction couch roll, a 25 inch suction press roll, with 168 inch width of wire. These last two weighted approximately seven tons each, and had to be derricked up the elevator shaft to their place on the floor, at very great expense. This was a carload exhibit, comprised of some of the special equipment which this company supplies to the paper mills. (No. 20.)

Booth 88. Sealright Company, Inc., Fulton, N. Y., displayed their paper containers in conjunction with a new type of shipping and storing container for ice cream, called a Glacifer.

Booth 170. W. E. Shuttleworth & Co., New York City, manufacturers of folding cartons of every description, displayed on shelves surrounding their booth, cartons printed and folded as for use. These were principally food packages.

Booth 131. Swenson Evaporator Co., a subsidiary of the Whiting Corp., both of Harvey, Ill., makers of reclaiming machinery for soda and sulphate pulp, and evaporators for all liquids. No machinery was shown here. Photographs on the wall and in albums were used for the purpose of illustrating talks.

Booth 120. W. O. & M. W. Talcott, Providence, R. I., showed samples of joints, belts and belt fastenings, for use on paper machinery. These are especially adapted for the rubber Fabric belts. Samples of joints suitable for every type from single leather belts to the heaviest 12 and 14 ply fabric conveyor belts were shown.

Booths 138-139. Taylor-Wharton Iron & Steel Co., High Bridge, N. J., showed Tisco manganese steel one-piece beater roll, and small castings of Tisco manganese, chains, etc. (See Ill. No. 5.)

Booths 74-75. Union Bag & Paper Corp., New York City. A painting showing the pine forests of the north, a pile of lumber and a hurrying stream formed the background of this exhibit. There was also laps of pulp, and every stage was represented in the making of paper, from the logs to the finished sheet. Bags, printed and unprinted, filled and empty, of all kinds, completed the exhibit. (See Ill. No. 30.)

Booth 126. Union Sulphur Co., New York City. This was one of the booths which was equipped with comfortable furniture, but no samples of merchandise. "A hand-shaking proposition."

Booth 16. The U. S. Bureau of Standards, which included the U. S. Foreign and Domestic Service, showed samples of experimental paper made out of widely different fibers. There were a number of charts, showing the great need for the standardization of paper, and the standardization of the size of publications. There were also photographs showing the laboratory of the Bureau, at Washington, D. C.

Booths 27-28. U. S. Forest Service showed by means of pictures and charts what was our present available forest and water supply, and the widening distance between raw material and sources of material to finished product. On one painting, there was a caption which read, "Alaska was a virgin field for gold hunters in 1898. It is a virgin field for paper makers now."

Booth 36. U. S. Testing Co., Inc., N. Y. City, are commercial chemists in the paper field, and do commercial testing for manufacturers and consumers. This was another "hand-shaking proposition."

Booth 157. University of Maine, Orono, Maine. This booth was maintained by the Pulp and Paper School, which is a section of the Chemistry Department of the University of Maine. It was furnished for comfort, and while the visitor rested he might look over photographs showing the chemistry laboratory, and read the outlines of curricula.

Booth 141. Voorhees Rubber Mfg. Co., Jersey City, N. J. Great rolls of transmission belt, six, eight and twelve inches wide, coils of steam and water hose, 24 inch steel pump valve covered with rubber, and a display on a red velvet case in the back of the booth of rubber covered tools for electrical work, and rubber covered pulleys. (See Ill. No. 11.)

Booth 73. Joseph H. Wallace Co., New York City, industrial engineers, showed samples of many different fibers they have investigated for the paper industry, samples of chips of southern pine before and after the recovery of by-products. Samples of the by-products were shown. (No. 27.)

Booth 87. Westfield River Paper Co., Russell, Mass., and their selling agents, **The Becker Paper Corp.,** N. Y. City, showed samples of glassine, both plain and embossed, printed glassine bags and candy box wrappers, bottles and cigarettes wrapped in glassine. There were rolls of glassine from two to eighteen inches wide and samples of the pulp from which this paper is made.

Booth 34. Williams Apparatus Co., Watertown, N. Y., showed a pulp drying cabinet equipped with automatic temperature control for testing, sample sheet making outfit to give a bone dry sample in ten minutes, an electrical centrifugal extractor; a strainer bowl with funnel,—all of its equipment intended to enable quick, accurate testing under absolutely controlled conditions.

Booth 26. William Bond Wheelwright, of Boston, Mass., a specialist in advertising for the paper industries, displayed in his booth well written and carefully printed samples of advertising which he has done for paper and allied trades. Mr. Wheelwright was for many years actively identified with the paper trade in the manufacturing and jobbing, and previous to that as a printer. He has now opened an office of his own to give advertising and merchandising counsel to the paper and allied industries. In his exhibit may be seen copies of Alfelco Facts, the house organ issued for the Albany Felt Co., Albany, N. Y. This is a pocket size technical magazine which goes to paper makers and to a large number of their machine tenders.

EXPOSITION PROGRAM

MONDAY

The first day of the exposition, found many of the exhibitors putting the finishing touches to their displays. There were not many visitors. Paper men in New York for the convention, were busy at the Waldorf, registering at the convention headquarters, and greeting friends.

TUESDAY

This was a busy day for the exhibitors. In the afternoon, the convention adjourned, so that the paper men might visit the exposition in a body. The day was to have been especially devoted to paper salesmen, but from the crowd, and the familiar faces of many of the manufacturers, it seemed as the entire convention had arrived.

During the afternoon, a meeting, not too well attended, was held in the conference room of the Exposition, which concerned itself with the subject of clean food packaging. O. B. Towne, secretary of the Clean Food Association, presided, and very ably, too. He gave one of the best talks of the meeting. The audience seemed to be composed mainly of men interested in making waxed and parchmentized paper, boxboard, or boxes, to whom all the speeches were probably "old stuff", but they agreed with the several speakers on all points.

Mr. Towne told of the dangers of food becoming contaminated from handling and from exposure to dust laden air, and told of the work of the Clean Food Association and their efforts to have every possible item of food properly packaged.

After Mr. Towne's talk, it is safe to venture the opinion that no one who heard him will ever buy unpackaged food. He showed plainly the many contaminating elements, the careless handling of foodstuffs, and the dangers of buying loose food.

In this, as in the use of paper milk containers, the speakers agreed, there is need for a vast publicity campaign, to educate the public as to the necessity for food protection, for this will not be brought about until the public discovers that it needs it and then demands it.

J. Kindleberger, president of the Kalamazoo Vegetable Parchment Company, Kalamazoo, Mich., spoke of the various uses for parchmentized paper in food packing, and showed photographs to prove his points. Citrus fruits, he said, could be kept in perfect condition from two to three times as long, when properly wrapped, as when packed unwrapped. He used the words "special wrapping", which everyone took to mean his own paper, since Mr. Kindleberger was stressing the need for using this brand of paper. He added that he had just received a letter from Henry Ford, saying that he is intensely interested in the conservation of food, and the cheapening of transportation. "The conservation of food," said Mr. Kindleberger, "can be accomplished through the proper packing of food. And because proper packaging makes

for ease in handling, probably the cheapening of transportation could result from proper packaging, also."

George R. Browder, general manager of The Container Club, told of the virtues of fiber containers, and gave specific instances of their use in packaging foodstuffs for ocean shipment, as well as for transcontinental shipment. He offered good arguments for the use of fiber containers instead of wood, on the ground that it is a patriotic duty to save the timber supply of the country, and he offered also the information that fiber containers are cheaper than wood boxes. They take up less space and weigh less which brings down the shipping cost, and as they are resilent to a greater extent than wood, protect to just that extent more than wood boxes.

Mrs. Louis R. Welsmiller, Deputy Commissioner of Public Markets of the City of New York, talked both from her official point of view and from the standpoint of the housewife on "Waste and Destruction of Food Through Exposure and Faulty Wrapping". Mrs. Welsmiller struck the personal note in her talk, and gave the assembled paper men some feminine ideas on her subject. She showed them, as one man said he never understood before, how thoroughly a housewife comes to depend upon the wrapped package to deliver food of a consistently high quality. She said that manufacturers of foodstuffs were overlooking an opportunity to educate women in new ways of cooking their products, by omitting to add new recipes to the outside of the packages, adding that many women looked for these recipes before they bought the foods. Later in her talk, she admitted that women were illogical enough to condemn a brand of food, even after using it for years, because they got one or more packages below the standard quality. A trademark on food is a promise of uniform quality, and the manufacturer who packages his foodstuffs needs to use every care to keep them up to his standard of quality.

Louis T. Stevenson, of the Mountain Mill Paper Company, spoke on "Greaseproof Paper as a Meat Wrapper; Glassine as a Candy Wrapper"; and drew word pictures of the chaotic conditions that would exist if we had no protective wrappings for meats.

All of the papers covered the same ground, but the subjects were approached from different angles, and each speaker added his own particular ideas to a subject of vital importance.

Credit was given to the food packers themselves for the great strides which have been made in food protection, and the suggestion was offered several times, that there is opportunity for closer co-operation between the manufacturers of protective papers and containers, and the packers.

WEDNESDAY

There were no meetings at the exposition on Wednesday, but the crowd was larger than on either of the two previous days. The most distinguished visitors recognized by the reporters were Congressman Begg, of Sandusky, Ohio; Senator Pat Harrison, and John Strange, ex-lieutenant governor of Wisconsin.

At such times as there have been no meetings, moving pictures of educational value, have been shown. The room set aside for meetings proved too noisy for the speakers, so the pictures were discontinued on such afternoons as there were meetings. Industrial motion pictures, showing the manufacture of rope, paper, drinking cups, and various branches of the work of the U. S. Forestry Service, were thrown upon the screen every evening, and on three afternoons. These were well attended, but the audience seemed to be recruited from outside the ranks of the paper men.

THURSDAY

This was TAPPI Day at the exposition. The technical men had a day all to themselves, and the meeting was well attended. The first paper was read by G. H. Spencer, of the SKF Industries, Inc., of New York City, and was illustrated with a chart thrown on the moving picture screen, showing the tensile strength of 70 mesh wire gauze. His subject was "Frictionless Bearings".

Next was a paper entitled, "Cleaning Paper Makers' Felts", by Prof. G. H. Haven, of the Textile School of Massachusetts Institute of Technology. Illustrating this were many slides, and one wall of the lecture room was lined with blue prints and samples of felts, showing the effects of various washing powders.

Dr. Haven's slides showed the laboratory at the Albany Felt Company, and illustrated some of the tests they make in their efforts to find the best materials to use in cleaning felts. He said that boiling has little effect on the quality of the felts, and effects the strength and stretch very little. He attributed almost all of the damage that results from cleaning felts to the washing powders and acids used. He said that good soap is as little harmful as anything, but that few mill men would take the time necessary to cleanse a felt with pure soap, and added that the soap powders marketed today reduce the strength of the felts one-third or more. Microscopic slides were used to show the untouched virgin wool, and other slides showed chemically attacked fibers from washed felts. His charts showed the results obtained from the use of twenty-five different washing powders. Dr. Haven told of all the harm that came to felts in the washing process, but, as far as this reporter could discover from his paper, he had no remedy to offer.

Third on the program was R. G. Best, of the Western Paper Makers' Chemical Company, Kalamazoo, Mich., whose paper was on "Froth Troubles in the Paper Mills". Some discussion followed his paper.

Next, Thomas E. Dial, of the Vacuum Oil Company, spoke in place of A. A. Capelle, who was ill. Mr. Dial's talk was on lubrication, illustrated with slides showing the proper and improper methods of lubrication. He began with the story of oil production, and used slides to show pictures of the oil fields, and the various refining processes, as a basis for his talk on the different lubrication requirements of different machines. He said that the mill man should trust the oil man to provide the lubricant and the method of applying this lubrication, best suited to the machines. It is the business of the oil man to analyze the machinery, and being technically trained in this work, he can prescribe the lubricant which will work best.

Mr. Dial spoke at some length on the amount of power wasted in a plant where lubrication is a haphazard affair, and showed charts representing investigations in nearly every country in the world, to prove his points. He gave figures to show how much money a waste of ten horse power means in a year's operation of a plant, and said that all improperly lubricated machinery requires from ten to fifty per cent additional horse power to operate, aside from the ever present danger of scoring and seizure of bearings, when there is not proper lubrication.

FRIDAY

Friday's meeting had some most interesting speakers. The first was Alfred B. Hitchins, Ph. D., F.C.S., F.R.P.S., who is contributing editor of the Photographic Journal of America, and associate editor of The American Cinematographic. His paper was on "Photographic Papers and Their Peculiarities". Dr. Hitchins spoke strongly of the need for making more photographic papers in America. He told of experiments he had made. He said that one reason why German photographic paper was so successful was that it was made almost entirely of old linen. American photographic paper is made of new cotton cuttings.

The second speaker was R. E. Rindfusz, Ph. D., secretary of The American Writing Paper Co., Holyoke, Mass., who read a paper on "Paper Standardization", interspersed with humorous comments. Dr. Rindfusz told of his company's cutting down their list of brands almost to half, by discontinuing the use of several trade names for the same or practically the same paper. He spoke of the advantage to jobbers, and to consumers of paper, of standardization, and pointed out the value of having one good brand that could be nationally advertised, rather than a number of brands each only known locally in the vicinity of a jobbing house.

Don Seitz, of the New York World, made a plea for preservation of our forests and water power, and he traced the destruction of our forests during the fifty years that ground wood paper has been made. He told the story of the first ground wood mill in this country, and that this first pulp was used in making utensils, and not paper. This was in 1883, when newsprint sold for eight cents a pound.

Mr. Seitz said that the United States Government can reforest an acre of land for sixteen dollars, under its present system of reforestation, and he predicted the necessity for the states to take a hand in the project of reforestation. He spoke of eighty million acres that ought to be reforested, but said that the farmers could not be persuaded to plant their lands to trees, from which posterity would benefit, and suggested a tenative plan for exempting farmers from taxation on such of their land as they planted to trees. Trees, he said, must be planted by state law, if we are to have reforestation on the large scale which is necessary. The state would have to survey the land, and send people who know reforestation among the farmers to pick out the land that was to be used for this purpose. Then those eighty million acres would become a perpetual source of wealth, and all wealth, he explained, came either out of the land or the seas. Mr. Seitz knows his subject thoroughly, both from the standpoint of the land owner, and from the standpoint of the newspaper man, who understands how many trees must be cut

to furnish the daily tonnage of paper necessary for his paper.

The last speaker was Brad Stephens, editor of Direct Advertising, Boston, Mass., whose subject was "Cover Papers, Catalogs, and Folders."

Mr. Stephens passed to the audience samples of cover papers, and asked them if they could tell which was the wire side of each sample and which the felt side. The test was not very successful, due to the poor light in the room. Mr. Stephens said that his interest was not so much in the cover paper itself, but in what an attractive cover could do for the booklet or catalog, in saving it from the waste basket, and in intriguing the recipient to look between the covers.

Mr. Stephens especially urges the economy of having the best artists obtainable design the covers, and specify the color of cover paper to be used. This, he said, obviated the necessity of proving up the colors before beginning to print.

SATURDAY

This was set aside as Consumers' Day. There were no meetings, but educational moving pictures of the paper industry in all its various phases, were shown in the afternoon and evening.

Eighth Annual Meeting of the Technical Association

THE EIGHTH annual convention of the Technical Association of the Pulp and Paper Industry was held at the Waldorf-Astoria Hotel in New York on April 9, 10, 11 and 12. Meetings began with committee sessions on Monday afternoon, and were held mornings and afternoons on Tuesday and Wednesday, while members attended the general meeting of the American Paper and Pulp Association on Thursday. The Technical Association meetings were well attended. One of the features of this year's gathering was the large number of Canadians who journeyed to New York for the convention.

A new administration of officers was elected by the Technical Association. George E. Williamson, of the Strathmore Paper Company, Mittineague, Mass., retired as president after serving two terms, and in his place Howard S. Taylor, of H. S. Taylor, Dayton, O., was elected to the presidency of the association for the ensuing year. Grellet N. Collins, of Dill and Collins, Philadelphia, was elected vice president in place of Frederick C. Clark, who resigned owing to pressure of business activities, and B. T. McBain, of the Nekoosa-Edwards Paper Company, Port Edwards, Wis., was elected to the Executive Committee to fill the vacancy made by the withdrawal of Mr. Clark. William G. MacNaughton was re-elected secretary and treasurer.

The Executive Committee, as revised by the elections, is composed of the following: George E. Williamson, B. T. McBain, Grellet N. Collins, George H. Harvey, E. C. Tucker, George K. Spence and Royal S. Kellogg.

At the opening meeting Tuesday morning, the members were welcomed by Dr. Hugh P. Baker, Executive Secretary of the American Paper and Pulp Association, after which President Williamson read his annual address.

Mr. Williamson in his annual address reviewed the operations of the Technical Association during the past year, and made several suggestions or recommendations for strengthening and widening the service of the organization to its members. He suggested that the various standing committees hold meetings at least once a year during the interval between annual meetings, and also recommended that the Service to Members Committee be enlarged, so that this committee could keep in closer touch with the standing committees and the membership.

President Williamson also recommended the adoption of proposed rules of standard practice, and urged the continuance of the co-operative work of the association with the American Paper and Pulp Association and the Canadian Pulp and Paper Association. He suggested that joint committees be formed for a combination of effort with the Canadian Technical Section, similar to that effected by one committee on vocational education.

A short talk was given by Howard Richards, of the Metric Association, boosting the metric system and urging its general use in paper and pulp mills.

The chairmen of the various standing committees were then called on to submit their reports.

Committee Reports

REPORT OF THE COMMITTEE ON COATED AND PROCESSED PAPERS

By Edwin Sutermeister, Chairman

During the past year the Committee on Coated and Processed Papers has prepared four papers, two by Norman Clark on "Coloring Matters for Coated Paper" and "Raw Stock or Paper for Coating," one by H. H. Holden on the "Manufacture of Lake Colors" and one by J. O. Ross on "Drying and Conditioning of Coated and other Processed Papers." These papers have been pre-printed and mimeograph copies have been sent to those members who would be most likely to be interested in the subjects. They will be read at the sectional meeting to be held Wednesday morning and it is hoped that there will be a large attendance and a profitable discussion.

The past work of this committee has related almost entirely to coated papers to the exclusion of those which might be included under the heading of processed. It is our belief that for the coming year our attention should be directed toward the branches of gummed, waxed and glazed papers and possibly also toward vegetable parchment making. No definite subjects to work upon have been selected and we should appreciate suggestions.

We believe that a strong effort should be made to increase the number of TAPPI members who are interested in the work of this committee, and it is hoped that widening the field of subjects covered by our papers may operate to bring in more members. In Lockwood's directory for 1923 there are listed under the heading of "Glazed Coated Paper and Board Manufacturers" sixty concerns in the United States, and less than a dozen of these are represented in the membership of the TAPPI. It seems as though we ought to do better than that and as a start in the right direction our Secretary has sent a program of the present meeting and an invitation to be present to a large number of these unrepresented concerns.

REPORT OF THE COMMITTEE ON WASTE

By R. B. Wolf, Chairman, and G. D. Bearce, Vice-Chairman

The study of waste in the pulp and paper industry covers a broad field and in view of this fact the specific investigations of the committee outlined in this report were confined to the three following major subjects:

1. White Water Losses and Their Reduction.
2. The Utilization of Bark and Wood Refuse.
3. The Reduction of Broke Losses.

These subjects show material losses that can be prevented or materially reduced by the adoption of proper equipment and standard methods of procedure.

A large number of tests were conducted by pulp and paper mills independently and several specific tests covering the major problems were carried on by mills in co-operation with the committee and governmental bureaus. The results of the tests and the detailed information are given in the supplementary reports of the Waste Committee.

The results of a general investigation are also included and the other losses occurring in the pulp and paper industry are outlined with particular mention of specific items. This shows the possible scope of investigative work and indicates some of the problems that should receive future consideration.

White Water Losses and Their Reduction

The survey of this problem indicates with a few exceptions that this source of waste has not been seriously considered until recently. The general viewpoint of many operators has been that the effluent going away from the mill is a necessary evil and does not contain material of recoverable value. This idea still persists in many mills. Moreover, the waste water goes away from the mill under the buildings or in some other place that creates a hidden condition that is seldom investigated in a great many plants.

The first obvious fact in this study is that a majority of mills use too much water. This adds to the cost of filtering and furnishing fresh water and increases the material losses because an excessive volume of water, the common carrier,

goes down the sewer. Several mills have materially reduced their fresh water requirement and consequently their fiber losses by more extensive use of white water on the machine in the beater room and in other departments. The volumetric flow diagrams shown in the supplementary report and closely followed in actual practice indicate the possibilities of white water utilization. The sedimentation tank system provides an effective means of re-using water in the paper mill as indicated in the tests. As a practical example of the effective use of return water one mill reduced its fresh water requirements nearly 20 percent. A number of plants use from 10,000 to 12,000 gallons per ton of product per day in the paper mill alone with satisfactory results, while others use as high as 25,000 gallons. In a few isolated cases the maximum and minimum water consumption varies from approximately 6,000 gallons to over 40,000 gallons per ton of product.

The fiber loss per 1,000 gallons of white water going to the sewer is of course influenced by the volume of water per ton of paper. Under good operating conditions this should not exceed an attainable standard of 0.5 of a pound per 1,000 gallons and in the manufacture of some grades of paper should be even less.

The amount of material lost per ton of product in the white water showed a variation of from 1 to 12 percent in different mills. Some variation is expected between wrapping and kraft mills which use a large amount of long fiber stock and book and similar mills which use finer material and filler. Figures indicate that the average fiber loss per ton of paper should be 1 percent or less in kraft, sulphite, fiber board and other long fiber grades, and 1½ percent or less in book, news and other grades making paper from short fiber stock.

The use of screen savealls to reclaim the stock in white water has been adopted by a large majority of mills. The effectiveness of the saveall is largely dependent upon its mechanical condition. On grades of paper taking a medium or long fiber pulp, a modern and well operated machine of the revolving cylinder type should reclaim 75 percent or more of the stock delivered to the saveall. The sedimentation tank is especially adapted to the reclamation of short fiber stock and filler. One complete test of a settling tank system used in a book and bond mill showed a 95 percent efficiency of material reclamation and a clay and fiber loss of only 0.57 pound per 1,000 gallons of waste water.

The production of all grades of paper in the United States for the year 1922 was practically 7,000,000 tons. Every *one percent* saving means the conservation of 70,000 tons of material which at an average figure of $30 per ton represents a saving of over $2,000,000. A conservative estimate indicates that an average reduction of 5 percent of the waste water losses is possible.

The question of mill effluent is closely allied to the stream pollution problem which is becoming increasingly important. Legislative action is being strongly advocated in many sections and in some instances stream pollution laws have been passed and are rigidly enforced. More complete utilization of white water will do much to prevent stream contamination and tend to minimize the importance of the stream pollution problem.

The Utilization of Bark and Wood Refuse

The problem of using or otherwise disposing of bark from drums and wood room refuse confronts nearly every mill that makes its own pulp. The results of a survey of the problem were given in the Progress Report of the Waste Committee at the Detroit meeting, October 9, 1922, and the discussion of the subject brought out many valuable and interesting facts.

Practically all of the mills utilize their bark as fuel, although several find it cheaper to run it to the river. Some attempts have been made to convert bark into a cheap grade of paper but the assembly and conversion costs make it impracticable on a commercial scale at the present time.

About half of the mills using bark and refuse burn it alone and the remainder in combination with coal. The results obtained in a majority of cases indicate an inefficient use of the actual fuel value in the bark and refuse. To a large extent this is due to the moisture in the bark from the drums and to the design of the furnace. Consequently bark pressing equipment and furnace design were studied in connection with this problem.

Bark Pressing Equipment.—The heating value of dry spruce and balsam bark as determined from calorimeter tests ranges from approximately 8,200 to 9,400 B.t.u. per pound, and a conservative figure of 8,220 B.t.u. was established in computing the heating value of material of different moisture content. The moisture in unpressed bark from drums is 75 percent more and has a heating value of about 1,200 B.t.u. as fired. If the bark is reduced at 50 percent moisture the heating value increases to approximately 3,600 B.t.u. per pound as fired as shown on the curve of "Available Heating Values" in the supplementary report.

Several mill tests made on two types of bark presses indicate that it is entirely feasible and economical to reduce the moisture in bark to about 50 percent moisture. The operating cost of a bark press including power, repairs, etc., is estimated at about $2 to $2.50 per day per 100 cords of wood barked assuming that the operation of the press is automatic and does not require a special attendant. This gives a cost of 2 cents to 2½ cents per cord or about $0.20 per ton of dry bark pressed. The value per ton of dry bark based on $7 coal of average B.t.u. is equivalent to $2 per ton of dry bark compared to $0.70 for unpressed bark, thus showing an appreciable saving by the use of a bark press.

Furnace Design.—The problem of effectively burning bark and waste is no less important than the proper preparation of the material. The two methods of burning the refuse each have their advantages and are adapted to the different conditions encountered. When refuse is burned alone the dutch oven type of furnace is commonly used. Recent developments in the design of refuse furnaces outlined in the detailed report make possible higher efficiencies. Special attention has been paid to methods of feeding bark to the furnace and the concentration of heat in the combustion zone by means of refractory walls.

The dutch oven type of furnace is satisfactory when a continuous supply of refuse is available. Mills that have an intermittent supply of bark, as pointed out in the detailed report on the subject, have found it more satisfactory to combine the dutch oven with an underfeed stoker for coal. This gives greater flexibility as the change from coal to refuse is easily made so that the entire boiler room equipment is in use at all times. Moreover, the coal and refuse may be effectively burned in any proportion depending upon supply of bark from the wood room.

In general the chief points to be considered in the economical utilization of bark are:

1. The bark should be reduced to approximately 50 percent bone dry and fed to the furnace with some degree of regularity.
2. The design of the furnace should provide for sufficient grate surface to give correct combustion and refractory walls to help evaporate moisture.
3. Correct draft conditions for most efficient combustion should be determined and maintained.

Approximately 4,500 tons of dry bark would be produced per year in a mill with a daily consumption of 100 cords of rough wood. Assuming average heating values for coal and bark (50 per cent dry) and coal at $7 per ton, complete bark utilization indicates a possible fuel saving that is equivalent to a reduction of over $8,000 annually in the cost of coal.

The Reduction of Broke Losses

The question of broke is one that is continuously before nearly all paper mills. News print mills with their high speed machines and book and writing mills with their supercalendering, cutting and rewinding operations have the greatest percentage of broke. This problem in wrapping, kraft mills and specialty mills is less acute and in mills making tissue, board, building and similar papers the percentage of broke loss is smallest.

Many news print mills use effective control methods to reduce their broke to a minimum. Stock control by means of freeness and other tests in the groundwood mill has been adopted so that pulp of uniform characteristics will be delivered to the paper machine wire. The regulation of consistency is extensively used to get the correct proportions of groundwood and sulphite and also to help control the concentration of stock to the machine. The mechanical handling of the sheet on the machine by means of compressed air and with rope carriers on the dryers has also been a factor in reducing broke as well as the use of improved reels.

The character of stock in book mills and its action on the machine has been studied by some operators. The consistency regulator is also used to control the density of slush pulp so that the volumetric measurement will give the proper proportions of different stocks in the furnish. Standard methods of beating and jordaning have also been adopted by some mills.

The mechanical condition of the paper machine is no less important than the stock and many mills give this question a great deal of attention. The operating and engineering departments of several plants make a complete inspection of their machines every four to six months in order to keep them in good operating condition. Special attention is given to the alignment of all parts of the machine, carrying rolls are put in round and leveled and standard crown on press and calender rolls are maintained.

In order to keep a close check on operating conditions, standard methods of computing paper machines efficiencies that record and analyze the broke losses, time down and other operating information have adopted by many news mills. Nearly all mills keep a record of broke losses and in many book and writing mills the percentage of loss in each department is analyzed. Records of this nature are used to stimulate the interest of the operating departments in the reduction of losses by keeping the progressive facts before the operating crews and with this idea in view a standard method of compiling operating reports has been suggested and outlined in the supplementary report on this subject.

Another method that is effectively used to bring the broke losses to the attention of the workers and managements is to convert the broke and time losses to dollars and cents. The broke losses may be used with the cost statements as a subsidiary record, or, as is being done by one company, incorporated in the cost figures. The plan of placing cost figures of some kind before the operating departments is an effective instrument that greatly emphasizes the money lost on account of broke.

The important points in the problem of broke are:

1. The most important factor is good papermaking.
2. Correct stock percentages as well as freeness and consistency control is essential.
3. The machine should be kept in good mechanical condition throughout.
4. Complete operating and cost records are an effective instrument in emphasizing the losses due to broke and the necessity for their reduction.

General Investigation

A large amount of general information has been collected upon the other phases of waste that are more or less prevalent in the pulp and paper industry.

The following outline of the various manufacturing processes indicates the principal items in addition to those already discussed that should receive consideration in the effort to eliminate or materially reduce waste in the manufacture of pulp and paper.

1. Wood Preparation.
   (a) Reduction of losses in barking and cleaning wood.
   (b) Uniformity in production of ships.
   (c) Reduction of sawdust loss.

   The fiber loss from sawdust is an actual material loss. Tests indicate that the average loss of approximately 4 per cent can be reduced to 1 per cent by means of efficient equipment and proper attention to the mechanical condition of the chipper.
2. Groundwood Mill.
   (a) More complete utilization of white water.
   (b) Proper grinder regulation.
   (c) Reclamation of slivers and screenings.

   Appreciable savings are being made by the refining of screenings and several mills utilize the slivers from the bull screen by regrinding them in a special pocket.
3. Sulphite Mill.
   (a) Efficient use of sulphur and control of SO_2 gas.
   (b) More effective lime and limestone utilization.
   (c) More adequate cooling and recovery systems.
   (d) The utilization of waste liquor.
   (e) Economy of steam consumption.
   (f) Reduction of heat loss by the use of digester insulation.

   An asbestos mat digester covering has recently been adapted to sulphite mills that is approved by the insurance underwriters. Considerable savings will be made by the use of this type of insulation on digesters.
4. Sulphate Mill.
   (a) More effective chemical recovery and the economical use of materials.
   (b) Reduction of heat losses and economy in the use of steam.
   (c) Utilization of lime sludge and turpentine.
5. Soda Mill.
   (a) Effective utilization and reclamation of chemicals.
   (b) Heat recovery from rotary burners.
   (c) Utilization of lime sludge.
6. Old Paper Plant.
   (a) Reduction of sorting and dusting loss.
   (b) Reducing the material shrinkage in cooking and washing.
7. Rag Mill.
   (a) Reduction of sorting and dusting loss.
   (b) Reduction of shrinkage of materials in cooking, washing and bleaching processes.
8. Paper Mill.
   (a) Effective consistency control and volumetric measurement of stock.
   (b) Efficient use of wires and machine clothing.
   (c) Reduction of steam consumption in the drying of paper.
   (d) Reduction of heat losses due to radiation.

   One of the greatest preventable wastes in the paper industry is the lost heat from the drying system discharged through the roof of the machine room. Effective equipment is available that will reclaim a large percentage of this heat.
9. Steam Plant.
   (a) Economical feedwater temperatures and the use of treated water and condensate.
   (b) The reduction of dry chimney gas losses—economizers and air preheaters.
   (c) Reduction of radiation losses from boiler and furnace walls.
   (d) Reduction of combustible in ash.
   (e) Prevention of scale and soot.
   (f) Efficient stokers and other equipment.

   The average steam plant utilizes about 60 per cent of the heat in the coal. Effective control of operating methods by the use of the proper measuring and recording instruments makes possible an overall efficiency of 75 to 80 per cent. The reduction of boiler plant losses is one of the most important problems in the paper industry.

   The use of powdered coal in new and reconstructed boiler houses and the installation of oil equipment in new plants gives higher efficiencies and materially assists in reducing the cost of generating steam.
10. Bleach Plant.
    (a) Reduced chemical loss—bleach powder vs. liquid chlorine.
    (b) Reduction of fiber shrinkage and washing loss.
    (c) Use of electrolytic bleach.
11. Handling Materials.
    (a) The use of more economical wood and pulp conveyor systems.
    (b) Efficient handling and storage of coal, sulphur, lime, old papers, etc.
    (c) Improved storage facilities and handling methods for finished paper.
12. Power Transmission Losses.
    (a) Reduction of line shaft and belting losses.
    (b) The adoption of more efficient water, stock and suction pumps.
    (c) The reduction of motor, generator, and waterwheel power losses.
13. Wood and Pulp Storage.
    (a) Reduction of fire hazards in wood storage by the use of sprinkler systems.
    (b) Reducing pulpwood decay and the deterioration of mechanical and chemical pulp.
14. Management.
    (a) The adoption of effective cost keeping methods and operating records.
    (b) The consideration of employee representation and wage adjustment methods.
    (c) The development of insurance plans, pensions and medical treatment.
    (d) The supervision of safety education and vocational training.

In the final analysis all losses due to wasteful methods and inadequate equipment can be eliminated by efficient management. The operators, engineers, chemists and other trained men may develop new processes, perfect improved designs, evolve effective control methods and achieve other specific attainments and their adoption and utilization is largely dependent upon the good judgment of progressive management. Every new idea should be fully evaluated and all practical methods of waste utilization given complete consideration.

In the report on the "Elimination of Waste in Industry" made by the Federated Engineering Societies' Committee, of which Hon. Herbert Hoover was chairman, the problem is clearly outlined in the following statement:

"The investigation clearly indicates that industrial waste is caused not only by failure to use the time and energy of living man but also from failure to use the productive equipment which has resulted from the time and energy expended by past generations. In the effort to eliminate waste of human energy it is recognized that more must be accomplished in the same time or the same must be accomplished in less time, and to this end the vast heritage of recorded knowledge of past experiences must be made available to an ever increasing number of men."

WHITE WATER LOSSES AND THEIR REDUCTION

Supplementary Report of the Sub-Committee on Waste

By H. F. Obermann, Chairman; F. R. Hyatt; J. E. Plumstead

At the fall meeting of the Technical Association in Detroit a large part of the time was devoted to meetings of the "Committee on Waste in the Industry." The various sources of waste in paper and pulp mills was thoroughly discussed and the conclusion was reached that it seemed advisable to form sub-committees each dealing with one particular phase of the waste problem. The undersigned sub-committee was appointed to analyze and investigate paper and pulp mill waste through the mill effluents.

A survey of the industry was made in co-operation with the Forest Products Laboratory to ascertain in general the extent of these losses as well as the equipment used to reclaim stock. A large number of independent tests were conducted by various mills and two specific investigations were made in co-operation with the Paper Section of the Bureau of Standards at the mills of Dill & Collins and the Miami Paper Company.

Approximately 400 questionnaires (Exhibit A) were sent to a great many mills to which 64 replies were received. With very few exceptions, however, the information obtained in these questionnaires was very inadequate and little tangible data can be obtained from them. The only definite piece of information brought out and that very forcibly, was that most paper mills are in a happy state of ignorance as to the amount of fiber or other losses through their mill effluents.

Analysis of Questionnaires

A summary made up from these questionnaires is shown in Table 1.

Of these 64 mills, only 10 report any fiber losses and but 9 give any specific report on recovery. Thirty-three of the mills use savealls while entirely too few mills are represented in order to enable us to draw definite conclusions; the figures show that the tissue mills experience the greatest losses (maximum, 220 pounds per ton of product). Only 26 of the 64 mills gave definite answers as to the quantity of white water going to sewer per day and these figures in many instances are only estimates, as brought out by answers to question No. 4 inquiring into the method employed for measuring white water.

An analysis of the questionnaire and the answers received thereto brings out the thought that it is necessary to supply the operators with information which will enable them to calculate their losses on a standard basis. This should include the following items:

Table 1

	Total	News	Book	Tissue	Board	Special-Bond	Special-ties	Kraft
No. Mills reporting	64	8	6	11	22	13	3	1
No. Mills reporting loss and recovery	11	4	0	4	1	2	0	0
No. Mills reporting loss only	10	2	3	2	1	2	0	0
No. Mills reporting recovery only	9	1	1	0	6	1	0	0
No. Mills reporting neither	34	1	2	5	14	8	3	1
No. Mills using Savealls	33	6	4	6	10	5	2	0
No. Mills not using savealls	31	2	2	5	12	8	1	1
Fiber lost per ton product—Maximum	..	140	103	220	100	170	..	..
Minimum	..	16	15	3	20	9	..	..
Average	..	73	31	52	25	63	..	..
Fiber recovered per ton product—Maximum	..	40	135	91	50	39	..	..
Minimum	..	3	135	5	8	9	..	..
Average	..	27	135	18	27	24	..	..

Table 1-A

Types of Saveall Used

Type of Saveall	No. of Mills Using Saveall
Bird	4
Moore & White	2
Powers Cone	1
North	10
Angle	1
Improved Paper Machinery	4
Decker Machine	2
Squirrel cage	1
Fullner	1
Cylinder type	2
Noble & Wood	1
Own type and design	6
Pusey & Jones cone	3

1. Standard methods for calculating quantity of effluent.
   (a) Wier.
   (b) Measuring tanks.
2. Standard methods for sampling water.
   (a) Manual.
   (b) Automatic—i. e., water wheel or revolving arm sampler.
3. Standard methods for determining fiber and ash, as well as microscopical analysis.

Savealls

The fibrous material used in the manufacture of paper or pulp is of so much value that energetic steps should be taken to reclaim it from the mill effluents. In large mills, however, and particularly in paper mills which are operated in conjunction with other processes, such as sulphite and soda mills, the mill effluents carry usually beside the fibrous material numerous other substances, which if mixed with the fiber very materially depreciate the value of the material saved. It is thus of particular interest to reclaim the fibers at the source, that is, for instance, directly on the paper machine, so that the material saved may again and immediately be returned to the beaters or the paper machine from whence it came. This loss is influenced by the character of pulp used in the paper, although the effort of the mill to reclaim stock is the most important factor.

Savealls may be divided into two principal classes: First, those which reclaim and save fibrous material from the mill effluents and convert it into such a shape as to make it immediately suitable to enter the manufacturing process, and, second, those which save and convert the fibrous material into such a shape that it can be conveniently handled and stored. This latter type is particularly adapted to a mill making specialties or colors while the first type is preferably used in plants making long runs of one kind of paper.

Then again, the nature of the product of a paper mill has an important bearing on the selection of the proper type of saveall. News or book mills particularly will select types of savealls from which the stock saved can be again directly added to the process. Book mills are interested in saving a large quantity of the filler used. The settling tank method furnishes the most ideal installation in large mills where greater production and large quantities of waste water necessitate enormous settling capacity.

On the other hand, a specialty mill making small runs of numerous colors will naturally prefer a saveall which converts the stock into dry shape, in which form it can be conveniently handled and stored.

The principal reasons why savealls should be used in pulp and paper mills are:

1. To recover and save fiber.
2. To prevent stream pollution.
3. To afford check on manufacturing operation.

The value of a saveall, particularly from the latter standpoint, must not be under-estimated. In pulp mills particularly, numerous opportunities exist where stock can go to waste through leaky collars, pulp thickeners, broken screens, et cetera, which would be entirely undetected unless the effluent or waste from these machines is passed through a saveall.

The maximum allowable losses based on paper or pulp production should be approximately as follows:

(1) All long fiber stock ½ of 1 per cent.
(2) Mixed long and short fiber 1 per cent.
(3) Largely short stock 1½ per cent.

The first class includes kraft, sulphate, et cetera; the second, book, bond, et cetera, and the third, news, chip, board and low-grade specialties. This minimum is possible and attainable by: (1) More complete utilization of white water. (2) The use of efficient savealls.

The Re-Use of White Water

Water is used so extensively in pulp and paper mills as a common carrier for stock that it receives little attention. A complete analysis of water consumption usually discloses its excess use and indicates methods of economy. The fact that a 1-inch pipe under 40 pounds pressure will discharge nearly 350,000 gallons of water per day illustrates how easy water is wasted.

The problem of fresh and waste water utilization involves close regulation of stock consistencies and water volumes throughout the processes. The volumetric flow diagrams (Fig. 1, 2 and 3) for the ground wood, sulphite and paper mills, respectively, show how the white water can be controlled and used.

These diagrams are made for a 100-ton ground wood mill, a 25-ton sulphite mill and the two combined to make a news print mill.

A ground wood mill will operate under a balanced condition by eliminating fresh water showers from press and decker molds and returning the white water to the system as shown in the diagram. Where presses and deckers are operated without showers on the wires, it may be necessary to clean them once or twice per day with a high pressure hot water hose, but the expense involved is more than offset by the saving in stock accomplished.

On sulphite a good type of decker or press with proper care will remove practically 99 per cent of the supply. Under these conditions better results are usually obtained by not using too much of the sulphite white water back in the system. It is, though, a good plan to pass this water through a saveall if for no other reason than to serve as a tell-tale to show up

a leak in a deckle strap or a break in a wire long before it would be discovered otherwise.

A sulphite mill system serves as a good outlet for excess paper mill white water. In the case of the 25-ton system shown, 500 to 600 gallons per minute of the paper mill water carrying approximately 3 tons of stock per day, could be used to advantage. Under this condition the loss from the sulphite mill will be greater but still about 80 per cent of the stock in the paper mill water will be retained with the sulphite stock.

The paper mill system is drawn for machines having trays and is shown with tray and suction water supplied to a mixing box having baffles so arranged that all the tray water is used before any of the suction water. The supply to the machine includes the ground wood and sulphite production, the worked up broke and the recovered stock from the excess white water. The stock is shown as air dry consistencies up to the driers, purposely to bring out the book figure shrinkage between the air dry pulp and the finished paper.

This flow diagram of the paper mill (Fig. 3) shows a discharge of approximately 14,000 gallons of white water per ton of paper. In some mills it would be possible to reduce this to about 11,000 gallons per ton by further re-use of white water on screen and head box showers. Self-cleaning and cleanable shower pipes are being used with considerable success by a number of mills and in that way the fiber is saved at the source. A board mill recently adopted this type of shower and as a result cut down its fresh water requirements about 15 per cent.

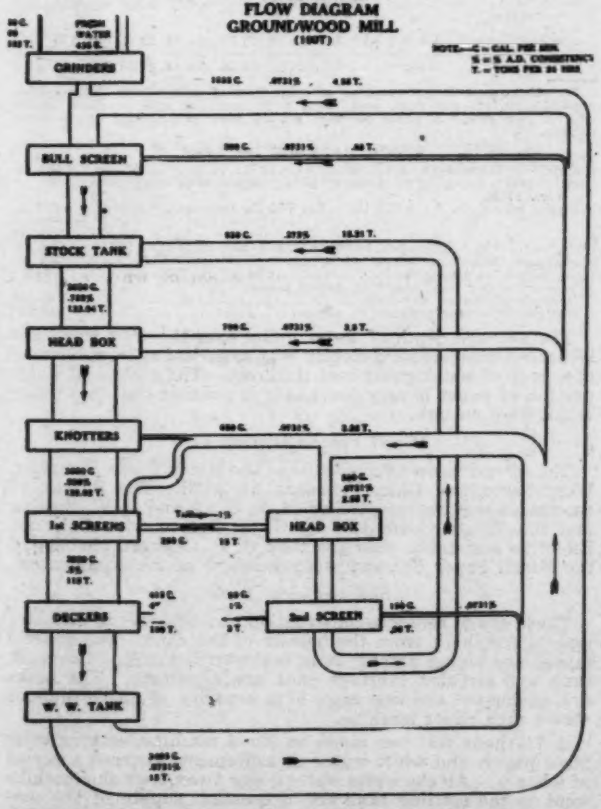
The Use of Savealls

There are three different types of savealls: (1) Inclined screen, (2) revolving cylinder, (3) sedimentation tanks, and though they all reclaim stocks, each has its special field.

The Inclined Screen Saveall

This general utility saveall is the most economical to operate and especially adapted to long fiber stock. A saveall of

Fig. 1
VOLUMETRIC FLOW DIAGRAM GROUNDWOOD MILL (100T)

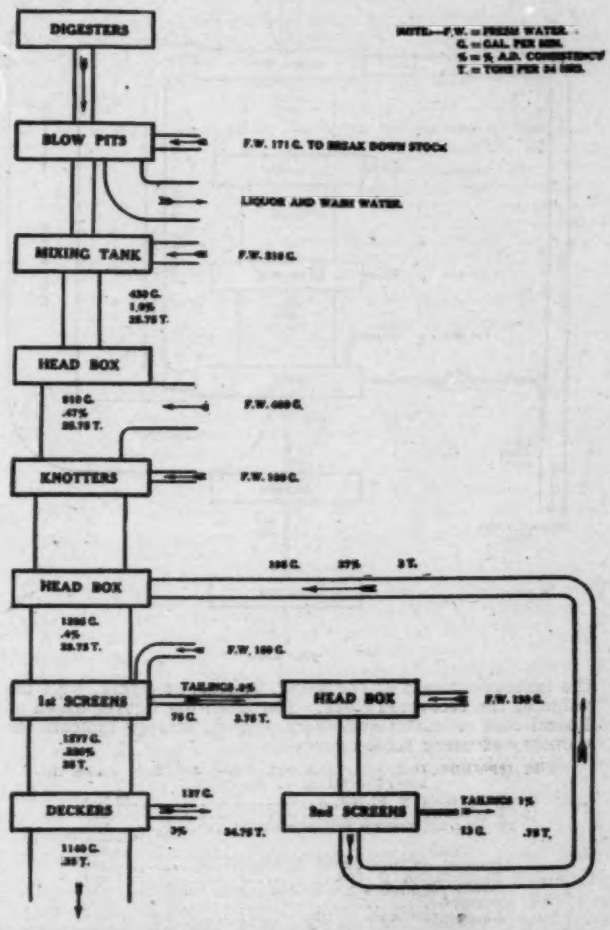


this type is usually made by the mill mechanics. It has an angle of 50 to 60 degrees, is approximately 12 feet high, wide enough to meet the screening requirements and is covered with a 65 to 75 mesh old fourdrinier wire. It is less effective on medium fiber and short stock and tests show an efficiency of about 40 per cent.

The Revolving Screen Saveall

This type of stock reclaiming equipment is the one largely used in pulp and paper mills and needs no description. In general, savealls of this type that are well operated and kept in good mechanical condition should reclaim approximately three-fourths of the stock going to the saveall, or, in other words, attain an efficiency of 65 per cent to 75 per cent. There are a number of makes on the market and several of them have special features of design that tend to give

Fig. 2
VOLUMETRIC FLOW DIAGRAM SULPHITE MILL (25T)



more efficient results or decrease the operating cost. The Bird saveall operates intermittently, resulting in better felting of fiber on the wire and works well on varying loads. The North saveall is an outward flow machine and in addition to its stock reclaiming ability can deliver the reclaimed material at high or low consistencies. Several machines such as the Improved saveall use a suction-blower arrangement to remove the stock from the cylinder, thus eliminating the scraper or upper roll. The Woods machine and others have special features. The Oliver Filter is equipped with a special wire and suction that gives a very high operating efficiency in stock reclamation. This machine is used successfully to wash pulp and in similar material.

Fullner Saveall

The Fullner type of saveall is used by a few mills, but the expense of operation and upkeep is greater than for other kinds of savealls, consequently the return on the investment is small on ordinary grades of stock.

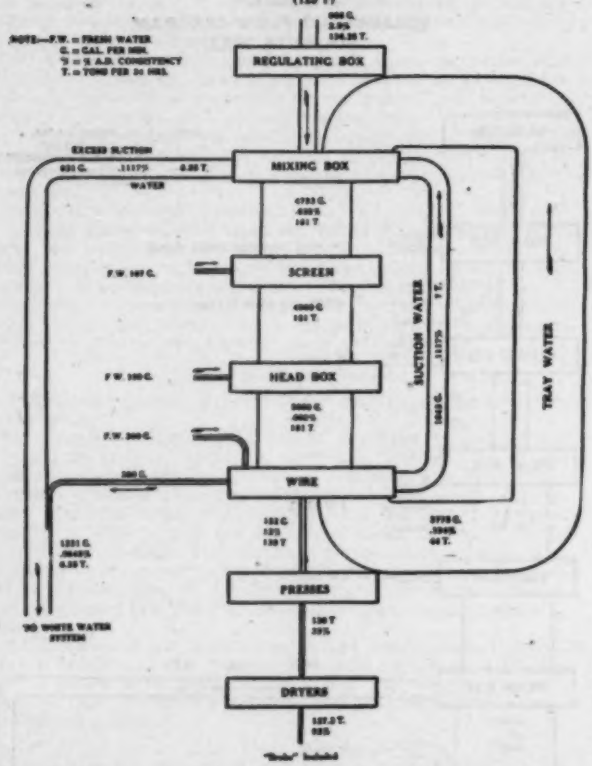
Tests on savealls have been accumulated from different sources and are reproduced as reported from the mills in the Appendix (Tables 2, 3, 4, 5, 6, 7 and 8). The varying conditions of grade of stock, water flow, condition of equipment, et cetera, partly account for the different results.

It cannot be over-emphasized that the mechanical condi-

tion of any saveall is one of the most important factors in its efficiency of reclaiming fiber. The best saveall made may be ineffective if not kept in repair and as a result all types may be condemned when they should not be.

The true measure of the value of the saveall is to compare

Fig. 3
VOLUMETRIC FLOW DIAGRAM PAPER MILL
(120 T)



the investment cost of operating, upkeep, et cetera, with the value of the recovered stock. The following figures based on liberal cost estimates and average stock savings indicate the economy of using screen savealls:

ESTIMATED COST AND SAVING WITH SCREEN SAVEALL
100-TON MILL (2 MACHINES)

2 Savealls @ $1,750	$3,500
Installation costs	400
2 Two-hp. motors and equipment	100
Total	$4,000
Interest on investment @ 7%	$280
Depreciation @ 10%	400
Power required 4 hp. @ $36 per hp. yr.	144
Repairs	100
Labor (one man ⅛ time)*	400
Total annual cost of reclaiming stock	$1,324

*Not always necessary.

Stock Reclaimed Per Day, lb.	Percentage Reclaimed Stock to Production	SAVINGS Value of Reclaimed Stock Per Ton	Gross Yearly Value of Stock Reclaimed	Net Saving Per Year
1,000	0.5	$50	$ 7,500	$ 6,176
		25	3,750	2,426
2,000	1	50	15,000	13,676
		25	7,500	6,176
4,000	2	50	30,000	28,676
		25	15,000	13,676

The smallest figure of stock reclamation represents an estimated saving of only 500 pounds per machine per day and on average stock should be attainable by the most ordinary saveall. The net saving for this condition at the lowest value per ton indicates that the investment will pay for itself in less than two years.

Sedimentation Tank Savealls

Considerable attention recently has been given to the use of continuous flow settling tank as a means to reclaim fiber and filler. There are several makes on the market, including the Pusey-Jones and the Booth systems, and a number of mills have constructed their own tanks from concrete or wood.

Several mills use the intermittent settling system with good results, although this type requires more attention and consequently has a higher operating cost.

In order to obtain some new data on the effectiveness of the settling tank system two mill tests were conducted through the courtesy of the Dill & Collins and Miami Paper Companies. The Bureau of Standard and Waste Committee co-operated in obtaining the data at these mills. The runs were made on offset and bond papers using similar grades and quantities of pulp and clay.

Dill & Collins Test

The test at the Dill & Collins mill was run on No. 3 machine making offset paper February 16, 1923. J. R. Kessler and other members of the company assisted in the work, which was directed by G. D. Bearce, of the Waste Committee, and M. B. Shaw and G. W. Bicking, of the Bureau of Standards.

The water from the wire and pit under the couch goes to a concrete tank in the basement and is re-used in the usual way. The surplus water is discharged through an overflow pipe to the sewer, as well as all of the other water coming away from the machine. No. 3 machine makes various grades and colors and has no saveall equipment other than the tank in the basement, although some settling action takes place there. The water coming away from the machine was measured by a wier. Later measurements of the overflow water established a basis of computing the total water going to the sewer. The white water was sampled for consistency at intervals during the test.

The following table shows the summary of results:

DILL & COLLINS
TEST MADE BY THE WASTE COMMITTEE AND BUREAU OF STANDARDS FEBRUARY 16, 1923

Flow of	Cubic ft. per min.	Gallons per hr.	Lb. Per 1,000 Gal. Fiber	Filler	Total	Lb. Loss Per Hour Fiber	Filler	Total	Calculated Lb. Loss Per Day Fiber	Filler	Total
White water from machine	3.826	1,668.8	5.24	5.34	10.58	8.755	8.91	17.66	210	214	424
White water from overflow	*9.97	4,463.0	3.00	3.48	6.48	13.39	15.53	28.92	321	373	694
Total	....	6,132	....	....	.....	22.14	24.44	46.58	531	587	1118

*A subsequent test showed an average flow of water from the machine of 7.815 cu. ft. per min. and from both machine and overflow 28.178 cu. ft. per min. A ratio of flow of 2.6 was established from these figures.

STOCK BALANCE OF TEST

Furnish to beaters (b. d.)	6,465 lb.
Sul., 46%; soda, 10%; ledger, 19%; broke, 8%; clay, size, etc., 17%.	
Paper made (b. d.) 4,898 lb. rolls; 772 lb. trim and broke	5,670 lb.
	724 lb.
Shrinkage (Est. difference between input and output)	795 lb.
Shrinkage (based on white water)	252 lb.
Loss, based on paper made	4.44%
Fibre and filler loss based on paper made:	
Gallons of water per day	147,168
Gallons of water per ton of paper	11,680

The average depth of water going over the weir was 0.956 inches. Considerable difficulty was experienced in measuring the depth of water going over the crest. The gallons of water per ton of paper is very low and it is possible that this figure is not high enough.

Miami Paper Company Test

The second test was conducted at the Miami Paper Company, West Carrollton, Ohio, February 27, 1923. The Bureau of Standards was represented by M. B. Shaw and G. W. Bicking and the Waste Committee by G. D. Bearce, vice-chairman. Effective assistance was given by O. P. Gephart, chemist of the Miami Paper Co., and other members of the organization.

Sedimentation Tanks

These are of concrete construction about 20 feet in diameter and 24 feet high from the bottom of the cone. The general layout and piping arrangement is shown in Fig. 4. The inner tank and circular overflow pans are aluminum. The tanks are all housed and one tank of a capacity of 35,000 gallons serves each paper machine.

A 7¼ hour test was made on No. 4 machine, making color plate paper, and white water measurements covered a period of 6 hours. All the white water going away from the machine went to the settling tank and a constant supply of the concentrated material from the bottom of the tank went back to the paper machine. Water for the beaters was drawn off through the supply pipe half way up the tank. The total amount of white water discharged by the settling tank was measured in concrete tank and the flow computed. The following summary gives the principal data of the test:

Grade of Paper		Book
Stock furnish (b. d.)		13,537 lb.
Sulphite	8,411 lb.	
Soda	1,283 lb.	
Broke	773 lb.	
Clay, size, etc.	3,071 lb.	
Paper made		10,400 lb.
Dry broke and trim		1,509 lb.
Wet broke		224 lb.
		12,133 lb.

White water discharged from settling tanks:

During test	90,812 gallons
Average per hour	15,135 gallons
Per day	363,248 gallons
Per ton of paper	18,089 gallons

Average pounds of material per 1,000 gallons of water to settling tank:

Fiber	Filler	Total
5.25	7.35	12.6

Average pounds of material per 1,000 gallons discharged from tanks:

Fiber	Filler	Total
0.085	0.463	0.548

Pounds of material lost from settling tank:

	Fiber	Filler	Total
During test	7.71	42.05	49.76
Average per hr.	1.285	7.01	8.293
Average per day	30.8	168.2	199.

Percentage of material loss in white water or the final effluent based on paper made:

Fiber and Filler, 0.49%

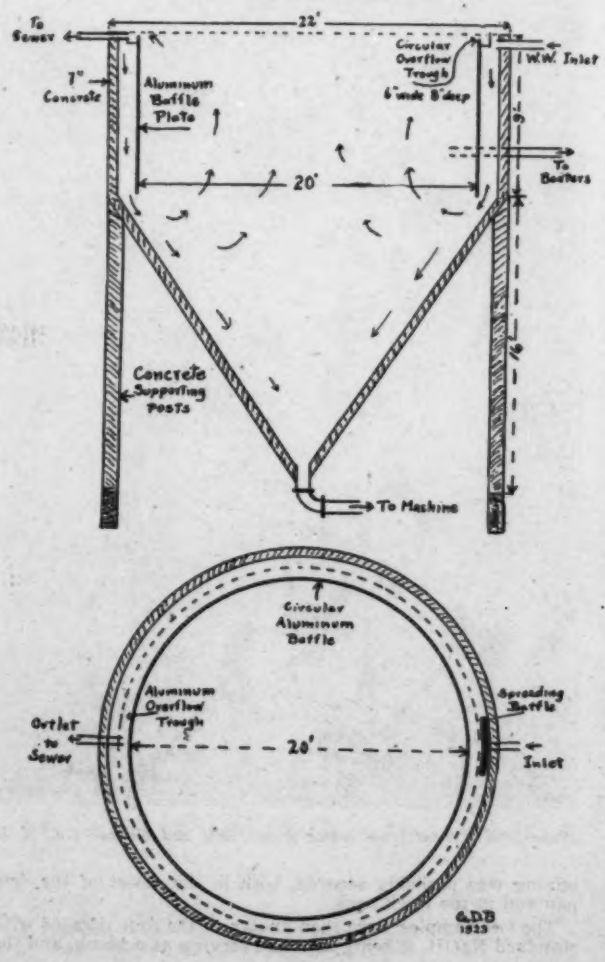
Note: 84.5% of this amount is filler.

Water from bottom of saveall going back to paper machines. Material per 1,000 gallons:

Fiber	Filler	Total
13.56	17.6	31.16

Note: Subject to correction.

FIG. 4
DIAGRAMATIC SKETCH
SEDIMENTATION TANK
Approximate Dimensions



This flowed continuously from the settling tank to the machine in approximately a 4-inch stream, but could not be measured.

The test showed that the sedimentation tanks worked very effectively and reclaimed 95.6 per cent of the fiber and clay going to the tank. The paper made by the mill is a very high grade bond and no trouble is experienced on account of dirt from the saveall. Great care is taken to keep the original stock clean.

The continuous sedimentation type of saveall appears to be adapted to mills using a large amount of clay, although it is being tried out on news stock and attains an efficiency of 75 per cent as shown in Table 6. With the use of an improved design and coagulents such as Boothal it is expected to get results nearly equivalent to those given for halftone, which is 97.6 per cent.

The analysis of the savings made by an installation of the sedimentation tank system is similar to that used in figuring the value of a screen saveall. The following estimates are based on average cost figures and different values for reclaimed stock:

Estimated Costs and Saving with Sedimentation Tanks

Book and bond—50-ton mill—2 machines.
2 concrete sedimentation tanks @ $9,000 = $18,000.
(Complete installations including pumps and piping, etc.)

Interest on investment @ 7%	$1,260
Depreciation @ 5%	900
*Additional power for pumps (25 hp. @ $36 per hp. year)	900
Labor and repairs	50
Total annual cost of reclaiming stock	$3,110

*A major part of the pumping cost is necessary in mill without tank system.

SAVINGS

Fiber and Filler Reclaimed Per Day, lb.	Percentage of Reclaimed Material	Value of Reclaimed Material Per ton	Gross Yearly Value of Material Reclaimed	Net Saving
1,000	1	$50	$ 7,500	$ 4,390
		25	3,750	640
2,000	2	50	15,000	11,890
		25	7,500	4,390
4,000	4	50	30,000	26,890
		25	15,000	11,890

Filler is usually about 50 per cent of total material saved.

Conclusions

The important points to be considered in connection with the various saveall systems are summarized as follows:

1. Measurement of all water going away from the mill and the determination of the extent of losses.
2. Reclamation of all possible stock in white water by using it at the source through self-cleaning showers and other means.
3. Computation of actual money savings and adoption of a saveall adapted to the particular grade of stock used.
4. Especial attention should be given to mechanical condition of the screen saveall.
5. Location of equipment should be so that stock is returned to the system whenever possible.

Microscopic Examinations

Samples of paper and white water were collected during the test at Dill & Collins, and submitted to the Forest Products Laboratory, Madison, Wis., together with other samples from the Miami Paper Company, and the Pejepscot Paper Company. The fiber lengths in each sample were measured and five photographs made (Plates 1, 2, 3, 4 and 5) that show the fiber in paper and white water.

The results indicate that white water contains fiber of average lengths in a majority of cases, as shown in the following table:

U. S. DEPARTMENT OF AGRICULTURE
Forest Service, Forest Products Laboratory
Data on ash and fiber measurements on paper and white water sediment

DILL & COLLINS
Offset Paper

P334.	Paper made	Offset
	Ash	%
	Fiber length, average of 100 measurements	1.84 mm.
P333.	Sediment from white water collected during the manufacture of P334.	
	Ash	43.3%
	Fiber length, average of 100 measurements	0.73 mm.

Samples submitted by G. D. Bearce, Vice-chairman of Waste Committee.

MIAMI PAPER COMPANY

Color Plate Paper

P338-3. Paper made .....46-lb. Color Plate
Ash ..... %
Fiber length, average of 50 measurements .....0.53 mm.

P338-1. Sediment from white water to the beater:
Total solids, per 1,000 gallons..... 5.5 lb.
Ash in dry sediment.....49.9%
Fiber length, average of 50 measurements .....0.64 mm.

P338-2. Sediment from white water to the machine:
Total solids, per 1,000 gallons..... 1.6 lb.
Ash in dry sediment.....42.9%
Fiber length, average of 50 measurements .....0.59 mm.

Samples submitted by O. P. Gephart, Chief Chemist.

Plate 1—Offset paper fiber, Dill and Collins Co., X 35

PEJEPSCOT PAPER CO.

News Print Paper

Sample No.	Description	Length Average of 50 measurements mm.	Total Solids Pounds per 1,000 gallon	Ash per cent
P339.	News print paper.....	0.99	...	...
P340-1.	Paper machine white water to saveall.....	1.58	4.1	2.0
P340-2.	Groundwood mill white water to saveall.....	0.48	5.3	1.4

Samples submitted by W. E. Brawn, Superintendent of Research.

TESTS ON STOCK BALANCES

A number of tests were conducted by the Eastern Manufacturing Company, Pejepscot Paper Company, and Watab Paper Company. A short summary, together with tables and quotations, outlines the important points.

Shrinkage of Materials in the Manufacture of Paper, Eastern Mfg. Company, H. H. Hanson

November, 1921.

A very complete test was made of the stock balance of the paper mill in this test on writing paper with the following furnish: Bleached sulphite, 62 per cent; bleached soda, 9 per cent; shavings, 19 per cent; filler, 10 per cent. The stock and paper were all carefully weighed. The test covered a period of 8 hours, 27 minutes.

The waste white water from the paper machine consists of the following:

1. Drainage from the last quarter of the fourdrinier screen.
2. Wash waters from the screen upon its return to the headbox.
3. Water from the four suction boxes adjacent to the dandy roll.
4. Water from the suction couch roll and suction box just beyond. .....
5. Water from the squeeze or pressure rolls.
6. Drainage from the floor when the machine is washed down.

The following dilution method was used to measure the volume of white water:

A carboy of 50 degs. Bé. caustic solution was obtained from the cooling tanks at the caustic evaporators, and was fed into the drip pan under the machine at a constant known rate. This was accomplished by means of a vertical 2-inch glass tube about 3 feet long, which served at a constant head box to feed the caustic. A screw cork was placed on the tube running from the bottom of this glass column to the drip pan, and a predetermined rate of flow was approximately regulated. The head was kept constant by admitting caustic into the tube at the same rate, from a siphon attached to a storage bottle. The quantity of caustic fed to this storage bottle was carefully measured and the time noted, care being taken to have the initial and final levels equal, in this bottle. In this way the rate of feed was known for each run. Samples of the waste water were taken in the trough in the basement floor just before admitting the caustic, and also after the caustic had been running for seven or eight minutes. Good

Plate 2—Sediment from white water, Dill and Collins Co., X 35

mixing was probably secured, both in the outlet of the drip pan and in the brick tank.

The two samples were then analyzed, the first titrated with standard NaOH, it being acid and serving as a blank, and the

second with standard HCl. From these analyses and the rate of admittance of the strong caustic (normality—16.14) the rate of flow could be calculated as gallons per minute.

TOTALS—INPUT—BONE DRY

	Lb.
Sulphite pulp	11,290
Soda pulp	1,640
Shavings	3,570
Wet broke	763
Filler	2,100
Alum	368
Rosin size	539
Saveall white water pulp	146
Total b. d. material fed	20,416

TOTAL OUTPUT—BONE DRY

	Lb.
Paper	16,123
Dry broke	1,607
Wet broke	633
Saveall white water fiber	136
Accumulation of fiber in white water tank in system at end of run	6
Loss from saveall overflow	18
Loss from beaters	10
Loss in white water to sewer	25
Total measured output	706
	19,264

ASH AND SOLUBLE MATTER LOSS

Loss of materials other than fiber as determined by ash balance —not elsewhere included:

INPUT

	Lb.
Ash in filler	2,100
Ash in shavings	278
Wet broke	80
Alum—Anhydrous	368
Size	41
Total ash input	2,967

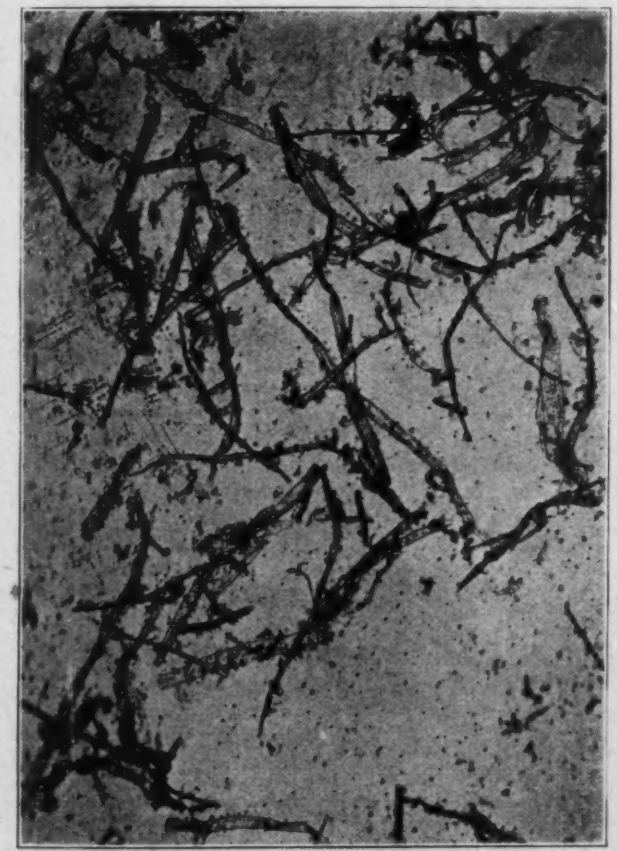


Plate 3—Color plate paper fiber—Miami Paper Co., X 35

OUTPUT

	Lb.
Paper and broke	1,930
Loss in ash	1,037
Added to output and known loss	20,301
Loss unaccounted for (20,416—20,301)	105

Water and Stock Balance—Pejepscot Paper Co., W. E. Brawn March, 1923.

This test was made on No. 7 and No. 8 news machines with capacities of 38 and 46 tons daily, respectively.

All of the water going to sewers was measured and consistencies determined. The mill saveall system was measured as well as the fresh water supply.

Taking the wire length from breast roll to couch, we make three divisions, calling them "wire pit," "saveall pit" and "couch pit." There are two machines with a single white water tank and one thick stock tank serving for both. All water going to the wire pit goes direct to the river; all water going to the saveall pit goes to the white water tank, and in case of breaks, when the stock is left on the wire, the plug in the couch pit is pulled and the thick stock goes to a tank from which it is pumped back to the beaters.

In the normal operation, all the water coming to the couch

Plate 4—Sediment from white water to paper machine—Miami Paper Co., X 35

pit overflows into the saveall pit and goes to the white water tank. There is a wire shower over the couch pit and another wire shower over the saveall pit.

In the following table the amount of water and consistency is given for running conditions. Consistency figures are on bone dry basis.

Water to the wire pit Source	No. 7 Mach. g.p.m.;	cons. %	No. 8 Mach. g.p.m.;	cons. %
Leaks and spills at milling box.	5	.22	8	.22
Screenings sluicing water from bird screens	25	...	50	...
Waste suction box water	90	.04	15	.04
Wire shower before breast roll	94	fresh	120	fresh
Hose water	80	fresh	80	fresh
Deckle strap showers	5	.02	9	.07
Tray water spills and wire losses	20	.22	25	.20
Total	319		307	
Water to saveall pit	g.p.m.;	cons. %	g.p.m.;	cons. %
Suction water from suction boxes	40	.04	210	.04
Overflow from mixing box	35	.22	41	.22
Wire shower over couch pit	150	fresh	180	fresh

Wire shower over saveall.....	125	fresh	135	fresh
Couch press water.....	11	...	13	...
Total	361		578	

From the above figures of water to the saveall pit, there are 940 gallons per minute going to the white water tank. From this white water tank, the distribution is as follows:

DISTRIBUTION OF WATER FROM WHITE WATER TANK

Water coming into tank.....	940 g.p.m.
Water going from tank to beaters, average per day....	85 g.p.m.
Water going to Moore & White savealls.....	389 g.p.m.
Water going to river.....	466 g.p.m.

The following summary of water going to the river includes several items not mentioned above:

	g.p.m.	Ave. cons. %	lb./day
Water from wire pits.....	626	.022	1,655
Overflow of white water tank.....	466	.025	1,400
Waste suction water 7 machine.....	80	.040	384
Water from 7 presses plus bearing cool. water	88	.010	105
Water from 8 presses plus bearing cool. water	100	.010	120
Filtered white water from M. & W. savealls	300	...	...
Waste white water not used by M. & W. savealls	89	.025	268
Total stock bearing waters to river	1,749	...	3,932

The above shows that we are normally losing 3,932 pounds bone dry per day. This would be true if we never had a break or a wash-up. We have run a lot of tests and have about proved that in addition to the above figure, we lose on the average 2,000 pounds of stock per day due to breaks and washups. This figure fluctuates considerably. This is for the reason that whenever stock is held on the wire and is showered off into the couch pit, a certain amount overflows into the saveall pit before the beater engineer gets the plug pulled to put this thick stock into the thick stock tank for delivery back to the beaters. Each minute that this happens on a whole mill basis is about 110 pounds of stock.

We have further checked total sewer losses with consistency and our losses show an average of 6,000 pounds per 24 hours, or 4 per cent. Due to our layout, we cannot get a good weir measurement of our main sewer.

White Water Measurements and Stock Balance at the Watab Paper Company, S. D. Wells, Forest Products' Laboratory

This report is a complete survey of the white water utilization and saveall systems of the Watab Paper Company. The volume of waste water was measured and an analysis made of the soluble and insoluble solids.

A stock balance was obtained covering a period of about eight days as follows:

Furnish	Tons	Waste Product — Paper Tons	Insoluble Tons	Soluble Tons	Unaccounted for—Tons
Fiber:					
Sulphite	45				
Book stock	41				
Shavings	18½				
Groundwood 200					
	304½	255	38½	6	5
Clay	41	27	13	..	1
Alum	5½				
Size	3½	3*	1½	5½	½
Silicate	1½				
	356	285	53	11½	6½

The furnish for the period amounted to 125 per cent of the bone dry weight of the paper furnished. The fiber furnish amounted to 119½ per cent of the fiber in the paper. An average retention of 65 per cent of the loading material was obtained.

Of the paper run during the period 88 per cent averaged 10 per cent ash, while 12 per cent averaged 4½ per cent ash. The performance during the period can be taken as typical with the usual run of Diamond C book paper.

Determination of proportion of pulp production obtained from solids in white water No. 2 paper machine May 27, 1922:

Average ash in lap pulp..... 2.25 per cent
Retention as determined above..... 77 per cent
Ash in stock from chest as computed from above data 2.92 per cent
Ash in insoluble solids from white water No. 2 machine ..... 33.3 per cent
Ash in groundwood pulp free from white water... 0.36 per cent
No conversion stock present.
Let X = proportion of stock derived from white water.
100 — X = proportion of stock groundwood.
XX 33.3 + (100 — x) .36 = 2.92 × 100.
32.9X = 256. X = 7.78 per cent.
Reported production of pulp = 76 tons.
7.78 × 76 = 5.92 tons present in pulp.
Furnish on No. 2 machine 91,930 pounds.
12.7 per cent of furnish recovered in pulp.

In the first test the results obtained seem to indicate that the solids recovered from the white water of No. 2 machine amounted to 24 per cent of its production and in the second test 7 per cent. In the third test it amounted to 12½ per cent of the total furnish, which with average performances would amount to 15 per cent of its production. From these tests it is reasonable to assume that an average of 15 per cent of the production or 12½ per cent of the furnish of No. 2 machine was recovered from the white water by the pulp.

Summary of Tests

	1	2 Nov. 17, 1921	3 May 27, 1922
Total pulp production, tons per 24 hours..	69	28	76
Total paper production, tons per 24 hours..	40	40	40
Groundwood pulp production, tons per 24 hours	25	28	76
Conversion pulp production, tons per 24 hours	35	0	0
Furnish on No. 2 machine, tons.....	..	..	45.97
Ash in white water from No. 2 machine, per cent of total solids.....	40	40	33.3
Ash in wet lap stock, per cent.....	6.1	3.6	2.25
Retention of clay on wet machine, per cent	80	80	77
Ash in stock in chests supplying wet machines, per cent.....	7.5	4.5	2.9
Ash in groundwood pulp, per cent.....	0.7	0.7	0.36
Ash in conversion stock, per cent.....	3.3	..	..
Recovered stock, per cent of pulp production	14	9.9	7.78
Recovered stock, per cent of paper production, No. 2 machine.....	24	7.0	12.7

Savealls

The type of savealls installed under both the No. 1 and No. 2 machines save considerable stock but the operation is far from perfect. Whenever tested by the writer the performance was not better than 30 per cent and the insoluble matter in the water after passing varied from 0.05 to 0.08 per cent of the

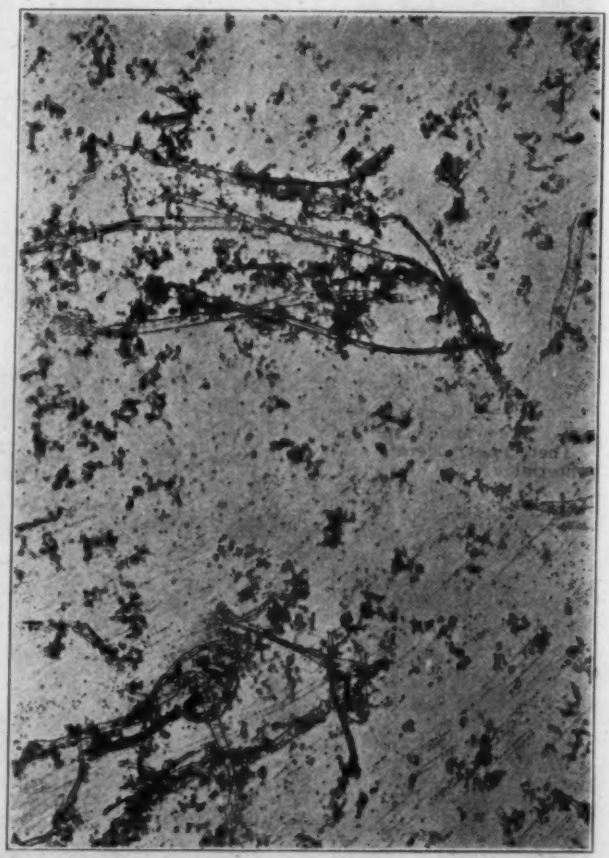


Plate 5—Sediment from white water to beaters—Miami Paper Co. X 35

weight of the waste. Tests at another mill with the same type showed efficiencies of 40 per cent. Tests on another type of cylinder saveall showed an efficiency of 62 per cent. The stock going to the saveall, however, was 0.0741 per cent while that to the first mentioned was 0.0476 which may have favored the performance of the latter machine. At the same mill two sloping screen savealls were also used. One covered with 65 mesh wire reduced the consistency of the stock to

*Ash from sizing material in paper was not determined for this balance, but has been found in other work on similar furnishes to amount to approximately 1 per cent.

0.052 per cent while the other with 75 mesh wire over the top half reduced the consistency to 0.027 per cent. On another occasion the latter saveall reduced the consistency to 0.020 per cent. It was set at an angle of from 50 degrees to 60 degrees and was eleven feet high. A saveall 15 feet long took care of the white water from a forty ton machine. As a rule the water passed through the wire before it had gone more than one-third of the way down the incline leaving the remainder to take care of surges or times when the sheet was passing under the couch on the fourdrinier above.

APPENDIX

Exhibit "A"
Fiber Losses
Their Measurement and Reduction

1. Kind of paper made.....
2. Normal daily production .....tons
3. White water to sewer per day.....gallons
4. Method of measuring white water.....
.....
5. Method of sampling white water.....
.....
6. Fiber per 1,000 gallons of white water effluent:
   (a) Total solids.....lb.
   (b) Ash free fiber.....lb.
7. Fiber loss per ton of product.....lb.
8. Present methods of re-using white water:
   (a) beater room.....
   (b) machine room.....
   (c) other uses.....
   .....
9. Method of fiber recovery:
   (a) Type of saveall.....
   .....
   (b) Water through saveall per day.....gallons
   (c) Fiber recovered per day.....lb.

Company .....
Reported by.....

Date .....

If figures given are estimates please so indicate.
Please use other side of sheet for additional remarks.

Sample of questionnaire sent out by the Forest Products Laboratory September, 1922.

Table 2—Laboratories XYZ Paper Company

Quantity of Stock in Waste Water Going to General Saveall

Composite sample of one pint samples taken every fifteen minutes from 7:30 A. M. to 2:00 P. M. on September 21, 1922.

Amount of solids.....0.2378 g. per liter
Amount of waste water approx. 12,000,000 gallons or 45,000,000 liters per day
Pounds of air dry stock per 24 hours, 26,212.. = 13 tons
General save all production—June, 1922..... = 25 tons
General save all production—July, 1922..... = 24.6 tons
= 1 ton per day

MILL CONTROL LABORATORY
(Signed) A. B. C.

Mill Waste Going to General Saveall—Microscopical Examination

From composite sample taken at 15 minutes intervals 7:30 a. m.—2:00 p. m. 9/21/22.

The fibers average two-thirds full length. They average much longer than stock going to the paper machines.

There is a moderate amount of fibrillae and abundant fine material. About the same amount of fibrillae but more fine material than in stock going to paper machines. Much of the fine material is not cellulose; it is probably clay.

About 20 per cent of the fiber is unbleached. Approximately 50 per cent of this is long and the balance broken fiber or small ray cells from wood.

This material contains a larger amount of fine dirt than ordinary stock but it is not what would be called dirty.

Microscopic Examination of Stock from General Saveall Wet Machine

Sample made 10:00 a. m., 9/22/22.

This stock averages about one-third the length of whole fibers.

It contains a very large amount of fine material, both fibrous and non-fibrous. It is very dirty.

The fiber in this stock averages a little shorter than stock going to paper machines. There is much more fine material and dirt than in regular stock.

Contains about 10 per cent unbleached fiber.

Sample made before 9/21/22.

This stock averages about two-fifths the length of whole fibers.

It contains a very large amount of fine material, both fibrous and non-fibrous. It is very dirty but not as dirty as stock described above.

Contains about 60 per cent unbleached fiber.

In comparison with stock shown in composite sample of material going to general saveall, reported under date of 9/21/22, this stock is about half as long, contains very much more fine material, and is much dirtier.

Fiber Losses in Paper Mill

All determinations made on composite sample taken over an eight hour period at one hour intervals June 29, 1921. The amount of matter in suspension was determined by allowing to settle, clear portion decanted and remainder filtered through filter paper and weighed.

No. 1.

Source.—Main sewer from No. 1, 2, 3 and 4 paper machines. The manhole to this sewer is located in sulphite pulp store room.

Quality.—60 per cent sulphite fibre, medium to short length. 40 per cent non-fibrous (alum, rosin, etc.).

Amount.—1.48 lbs. per 1,000 U. S. gallons water.

No. 2.

Source.—Water passing through wire No. 1 machine.

Quality.—80 per cent sulphite reduced to little or no length. 20 per cent non-fibrous.

Amount.—6.21 lb. per 1,000 U. S. gallons water.

This white water is immediately re-used on paper machines.

No. 3.

Source.—Water removed from wet sheet by suction roll No. 1 machine.

Quality.—10 per cent sulphite, medium to short length. 90 per cent non-fibrous.

Amount.—0.052 lb. per 1,000 U. S. gallons water.

No. 4.

Source.—Water which has been used in washing the wire No. 1 machine. Also if paper breaks at suction roll it will be collected in this water.

Quality.—Nearly all fiber mostly long to medium length.

Amount.—0.035 lb. per 1,000 U. S. gallons water. This water is re-used in furnishing beaters.

No. 5.

Source.—Water going to sewer from No. 1 machine.

Quality.—70 per cent sulphite, long to medium and some short 30 per cent non-fibrous.

Amount.—0.371 lb. per 1,000 U. S. gallons water.

No. 6.

Source.—Water going to sewer from No. 2 machine.

Quality.—50 per cent sulphite long to medium and short. 50 per cent non-fibrous.

Amount.—2.85 lb. per 1,000 U. S. gallons water.

No. 7.

Source.—Water going to sewer from No. 3 machine.

Quality.—60 per cent sulphite long to medium and short. 40 per cent non-fibrous.

Amount.—5.15 lb. per 1,000 U. S. gallons water.

No. 8.

Source.—Water going to sewer from No. 4 machine.

Quality.—70 per cent sulphite long to medium and short. 30 per cent non-fibrous.

Amount.—2.31 lb. per 1,000 U. S. gallons water.

MILL CONTROL LABORATORY.
(Signed) A. B. C.

Fiber Losses in Sulphite Mill

The following determinations of fiber losses at various points in the Sulphite Mill were made on composite samples obtained at one-half hour intervals over an eight-hour period. The determinations were run on three separate days.

The results were obtained by carefully filtering the waters from the sewers and then by examination and weighing of the dry filtered material. When quantity is expressed throughout this report, the amount of bone dry material per 1,000 U. S. gallons is meant unless it is otherwise stated.

No. 1.

Source.—Main sewer from all blowpits. This contains the spent acid and wash water from all blowpits. Any fiber contained in this is lost.

Quantity.—3/3/21	12/15/21	12/27/21
0.557 lb.	1.74 lb.	1.64 lb.

Quality.—Practically 100 per cent long fiber as in ordinary unbleached sulphite. 5 per cent of this is not cooked.

No. 2.

Source.—Water removed from stock by pulp thickeners. The major portion of this water is used for washing stock in the blowpits, the remainder is used for washing logs in the wood room. Any fiber contained in the water going to wood room is lost.

Quantity.—Amount per 1,000 U. S. gallons.

3/3/21	12/15/21	12/27/21
0.935 lb.	0.247 lb.	0.451 lb.

Quality.—40 per cent of this fiber. Some of the fiber is long, but most of it is short. 60 per cent is pitch and dirt.

No. 3.

Source.—Floor wash from east side of old screen room and water from tailing thickener. This goes directly to sewer. Any fiber contained in this water is lost.

Quantity.—3/3/21	12/15/21	12/27/21
.....	0.806 lb.	0.748 lb.

By determining the consistencies entering and leaving the thickener we were able to compute the approximate number of gallons of water removed per ton of pulp made. Approximately 128,000 gallons of water are removed per air dry ton of stock, or approximately 100 lb. of stock is lost at this point for every air dry ton of tailings made. This would mean the approximate daily loss at this point is 400 lb.

Quality.—60 per cent of this fiber. One-half of the fiber is long. 40 per cent pitch and dirt.

No. 4.

Source.—Floor wash from west side of screen room and white water from XX worm thickener. Also some overflow from No. 1 worm thickeners. This goes directly to sewer. Any fiber contained in this water is lost.

Quantity.—3/3/21	12/15/21	12/27/21
0.876 lb.	0.207 lb.	0.959 lb.

Quality.—80 per cent of this is fiber. Mostly short. 20 per cent pitch and dirt.

No. 5.

Source.—Water going to sewer from pneumatic saveall. Any fiber in this water is lost.

Quantity.—1/3/21	12/15/21	12/27/21
.....	0.280 lb.	0.476 lb.

Quality.—95 per cent of this fiber. Half of the fiber is long. 5 per cent pitch and dirt.

No. 6.

Source.—Overflow from trough in back of No. 7 wet machine. This is backwater from the wet machine and goes direct to the sewer. Any fiber in this water is lost.

Quantity.—3/3/21	12/15/21	12/27/21
.....	0.261 lb.	0.156 lb.

Quality.—50 per cent fiber, less than half of this is long, 50 per cent pitch and dirt.

No. 7.

Source.—Water from worm thickeners from Bellmer bleachers. This water goes to storage box near No. 5 paper machine and is used again in riffiers. The overflow from the storage box goes to the sewer. There is approximately 12,000 gallons of water removed by the thickeners per ton of air dry pulp.

Quantity.—3/3/21	12/15/21	12/27/21
1.43 lb.	0.982 lb.	0.465 lb.

Quality.—60 per cent of this is fiber. One-half of the fiber is long. 40 per cent pitch and dirt.

No. 8.

Source.—White backwater from bleached pulp washer. The greatest part of this water goes to the riffiers, the excess flows to sewer.

Quantity.—3/3/21	12/15/21	12/27/21
1.014 lb.	1.092 lb.	0.979 lb.

Quality.—Practically 100 per cent pure fiber. Half of this is long.

MILL CONTROL LABORATORY.
(Signed) A. B. C.

Table 3

Report on Test of Bird Saveall in Boxboard Mills

The stock from the saveall was pumped to one of our beaters, the contents of which was determined by calculation and the beater allowed to run full. The beater was then placed in operation in order to insure through circulation of the stock and a sample three gallons of the suspension was extracted. This quantity was then passed through a fine mesh screen and the weight of the dry pulp remaining above the screen was determined.

The following table shows the amount of time to fill this beater, the contents of which are 2,400 gallons, together with the dry weight of the pulp screened from the sample three gallons of solution and the calculated weight of usable materials in the beater:

Time to fill beater	Volume of sample	Dry weight of pulp in sample	Calculated weight of contents
18 hr.	3 gal.	16 oz.	867 lb.
15 hr.	3 gal.	10½ oz.	848 lb.
18¼ hr.	3 gal.	15 oz.	840 lb.
14 hr.	3 gal.	12 oz.	660 lb.
65¼ hr.			3,215 lb.

It may be seen from the above test that this saveall is reclaiming for us stock at the rate of 50 lb. per hour or 1,200 lb. per day, with which we are quite satisfied.

The wire covering of the saveall above is No. 40 mesh. The waste water delivered to the saveall is the normal discharge from 40 tons of boxboard, sheathing and bogus.

Table 4

Marathon Paper Mills Co., Rothschild, Wis.

Through the courtesy of M. M. Whitman, sulphite superintendent, I received the following report of some tests made on fiber recovered from blow pits:

"On the 20th of July a run was made on the wash liquor from the blow pits, and during this time the washings from 10 blow pits were collected and allowed to settle and drain through an old set of bleach drainers covered with matting.

"The weight of the wet stock was 2,480 pounds and a moisture test taken showed that the stock contained 86.50 per cent of water, leaving 335 pounds of air dry stock or 35½ pounds of air dry stock per digester.

"The second run on waste liquor was made on the 27th of July and during this run the washings from 23 blow pits or 322 tons were collected, the wet weight of the stock being 500 pounds and containing 90 per cent of water, leaving 500 pounds of air dry stock or approximately 22 pounds per digester."

Table 5

July 22, 1922.

Comparison of Saveall Equipment

Types of equipment—
(a) Bird.
(b) Improved Paper Machinery Co.
(c) 2 Types Inclined.

Size of equipment—

Location of saveall	Size	Angle	Wire Mesh
On 1 and 2 machines	11' x 32' face	50 deg.	75 top—65 bottom
On 4 machines	11' x 32' face	55 deg.	65

65 mesh wire is used Fourdrinier wire. Wire used on Bird and improved savealls is their regular wire.

Work done by different types of savealls—

	Improved	Bird	1 & 2 Inclined	4 Inclined
Going to—% b.d.	0.0476	0.0741	0.038	0.095
Going from—% b.d.	0.0288	0.0282	0.027	0.052

Tests given are average of hourly samples covering several hours of normal operation.
No. 1 and 2 machines combined daily capacity—85 tons.
No. 4 machine daily capacity—70 tons.

Test of Saveall Efficiency

	Improved No. 1 Machine	Bird No. 2 Machine
Period covered by test	3 p. m. Oct. 25 to 3 p. m. Oct. 26—24 hours	5 p. m. Oct. 24 to 7 a. m. Oct. 25—14 hours.
White water from machine—		
Average flow	570.6 g. p. m.	508.6 g. p. m.
Density	0.0476 % bone dry	0.0741 % bone dry
Stock per minute	2.26 lb.	3.14 lbs.
Stock per day	3254.4 lb.	4521.0 lb.
Overflow—		
Average flow	361.3 g. p. m.	116.4 g. p. m.
Density	0.0476 % b. d.	0.0741 % b. d.
Stock per minute	1.44 lb.	0.72 lb.
Stock per day	2073.6 lb.	1036.8 lb.
Through saveall—		
Average flow	325.0 g. p. m.	392.2 g. p. m.
Density	0.0288 % b. d.	0.0282 % b. d.
Stock per minute	0.78 lb.	0.92 lb.
Stock per day	1075.2 lb.	1324.8 lb.
Stock reclaimed per day		1859.4 lb.

Table 6

International Paper Company

Water From News Machines	Continuous speed	Variable speed
Supply to savealls—lb./100 gal.	0.616	0.616
Water through saveall—lb./100 gal.	0.316	0.166
Per cent of supply removed	048.7	073.0
Water from Sulphite Deckers and Presses		
Supply to inclined wire saveall—lb./100 gal.		0.074
Water through inclined wire saveall—lb./100 gal.		0.027
Per cent of supply removed		0.63.5

The above saveall equipment is all covered with old 60-mesh machine wire.

Loss from Above News Mill	
Average gal. per min. to sewer	1.970
Average lb. per 100 gal.	0.195
Total loss per day, lb.	5,520
Per cent loss of production	1.95
Settling Tank Equipment (News Machine)	
Rectangular tank about 10' x 12' x 12' with "V" bottom	
Avg. supply to tank lb./100 gal.	0.83
Avg. overflow from tank lb./100 gal.	0.22
Avg. water from bottom of tank lb./100 gal.	3.00
Per cent of supply removed	73.5
Avg. gal./min. overflow	210
Total Sewer Loss From Above Mill	
Gal. per min.	470
Avg. lb./100 gal.	0.170
Total loss lb./day	1,150
Per cent loss of production	1.75
Settling Tank Equipment (Halftone Machine) Special Tank	
Avg. supply to tank lb./100 gal.	0.316
Overflow from tank lb./100 gal.	0.023
Water from bottom of tank lb./100 gal.	2.8
Overflow from tank gal./min.	175
Loss from tank lb./day	53
Per cent loss of production	0.2
Per cent of supply removed	97.6

Table 7

American Writing Paper Co. Gill Division—Reclamation of Fiber Bird Saveall

1. Methods of Re-use of White Water:
   The pan water directly under the wire, rich in fiber and filler, is used over again in the head box of the machine. The suction box water goes back and is used in the head box.
2. Methods of Recovering Fiber from White Water:
   The savealls are of the Bird strainer type with a capacity of about 20,000 gallons per hour. The suction

couch roll water goes directly to the savealls. This contains very little fiber and filler. The water from under the wire and presses goes directly to the savealls. In case of a break at the couch, the sheet piles up in the pit and instead of being dumped back into the machine chest, the stock is allowed to accumulate in the pit, and then washed down into a cement, white water, storage tank. The overflow from this tank goes to the saveall.

3. Measurement of White Water Losses:

The volume of water going to the savealls is measured by a V notch weir. For the purpose of calculation, it is assumed that the same volume is discharged in the waste as enters each saveall. Samples are taken regularly to show the strength of the inlet water and the waste from each saveall.

4. Data and Results:

(a) Actual Losses:

1.	Volume of white water rejected	30,868 gal.per hr.
2.	Total solids in white water in per cent	0.04%
3.	Ash free fiber in white water in per cent	0.03%
4.	Total pounds solid lost per ton of product	50 lb.
5.	Pounds ash free fiber lost per ton of product	39 lb.

(b) Efficiency of saveall systems.

TO SAVEALLS

1.	Volume of white water	30,868 gal. per hr.
2.	Solids in white water in per cent	0.11
3.	Ash free fiber in white water in per cent	0.10
4.	Solids in white water in pounds	272 lb. per hr.
5.	Ash free fiber in white water in pounds	250 lb. per hr.

FROM SAVEALLS

6.	Volume of white water	30,868 gal. per hr.
7.	Solids in white water in per cent	0.04
8.	Ash free fiber in white water in per cent	0.03
9.	Solids in white water in pounds	90 lb. per hr.
10.	Ash free fiber in white water in pounds	75 lb. per hr.
11.	Solids recovered in pounds	183 lb. per hr.
12.	Ash free fiber recovered in pounds	175 lb. per hr.

(c) Cost of Operation:

No accurate data as to the cost of operating the savealls can be given at this time. However, on a 13 day test, it was found that the total expense for millwright labor to keep them at the highest efficiency, was found to be ½ of 1 per cent of the amount saved by the savealls.

(d) The foregoing data was taken on a run of U. S. Government postal card. The stock from the savealls was used to replace part of the magazine stock in the furnish.

We regret that we can offer you no conclusions either as to the cost of operation or the point of economy in the reclaiming of white water losses. Our investigations were not complete enough to justify any definite conclusions. We trust, however, that the information will be of service for your report.

(Signed) MILTON M. MANSHEL.

THE UTILIZATION OF WASTE BARK

Supplementary Report of the Sub-Committee on Waste

By J. D. Rue, Chairman; H. S. Taylor and E. P. Gleason

Your Committee has continued its study of the utilization of pulp mill barker waste as a fuel in 1920. Half of the spruce, balsam fir and hemlock consumed in the United States came to the mill as rough wood. The 2,400,000 cords of wood so used at 2,500 pounds dry weight per cord would on the reasonable assumption of 15 per cent waste yield 456,000 tons to be disposed of each year. A large proportion of the bark is removed by the wet drum method and it is not unreasonable to assume that the untreated bark will average 65 to 75 per cent moisture. This high moisture content constitutes a material obstacle to its use as a fuel. The investigation by the Committee has indicated that under favorable conditions of furnace design and operation it should be possible to burn bark of 65 per cent moisture and even without the addition of coal. It is possible, however, with presses now on the market to readily reduce the moisture content to 50 or 55 per cent at a reasonable cost for equipment, power and attendance.

Few mills have made a consistent effort to develop efficient methods for burning their bark. Some study has been made of suitable designs of furnaces and methods of operation for burning wet spent tan bark, fogged fuel, bagasse, etc. The data on a few tests on these materials were given in the report of this Committee at the Detroit meeting in October, 1922. Further detailed reports on studies of this kind are given by H. S. Bastian, of the Portland Railway Light and Power Company, and by D. M. Myers of the U. S. Bureau of Mines. "Generating Power from Waste," Electrical World, February 25, 1922, by Mr. Bastian will be reprinted, for the benefit of the members of TAPPI, as an appendix to this report. "Economic Combustion of Waste Fuels," by D. M. Myers, Technical Paper No. 279 (1922) U. S. Bureau of Mines, may be obtained from that Bureau or from the Superintendent of Documents, Washington, D. C., and is strongly recommended for careful study. It summarizes some of the most recent developments in the design and operation of furnaces for burning fuels containing amounts of moisture comparable with those met with the problem under consideration by this Committee. Myers reports a complete boiler test of an old furnace burning paper mill refuse and chestnut extract chips in combination with coal, which gives an efficiency of 40.2 per cent; without coal the efficiency was estimated at 25 per cent. A furnace specially designed for the purpose gave 52.6 per cent to 64 per cent efficiency without any coal. The fuel contained 58 per cent to 61 per cent moisture. Myers* reports an efficiency of 71.1 per cent of wet hemlock tan bark burned with an automatic stoker in a furnace specially designed by him. Bastian, in the reference given, reports the results of tests made by his company which show the increased efficiency obtained by the redesign of their furnaces for hogged Douglas fir mill waste. By tests on 500 hp. B & W boilers the efficiency was increased from 44.8 per cent at 114 per cent rated capacity to 71.1 per cent at 246 per cent rated capacity. The duration of the tests was 10 and 15 hours, respectively. One of the characteristic features in the redesigned furnace is a 22 inch hanging arch inserted directly over the bridge wall which compels a more complete mixing of the gases with air.

As pulp mills are normally operated the supply of bark is irregular so that it is not always practical to maintain a continuous supply to the furnace sufficient to operate it at maximum efficiency. It is, therefore, recommended by the Committee that in the study of the problem undertaken by individual mills careful consideration be given to the construction of furnaces provided with underfeed stokers so that variable amounts of coal can be added at will. Forced draft is also desirable. A number of such installations have come to the attention of the Committee and very favorable reports have been received of their operation. Arrangements have been made with several companies, some equipped with underfeed stokers, to make evaporative tests within the next few months. These tests will include the use of wet and dry bark from both spruce and balsam wood and probably with and without the use of coal.

Saving to the Industry

If the 456,000 tons dry weight, of bark annually produced in pulp mills could be burned at an average moisture content of 65 per cent and at an efficiency of only 50 per cent it would result in a saving of 157,000 tons of coal per year as the following data show:

456,000 tons dry weight are equivalent to—
1,300,000 tons containing 65 per cent moisture.
Heating value of coal assumed at 13,000 B. t. u. per pound.
Efficiency of burning coal assumed at 70 per cent.
Efficiency of burning wet bark assumed at 50 per cent.
Heating value in bark of 65 per cent moisture at 2,200 B. t. u. per pound wet bark.

One pound of coal is equivalent to $13{,}000 \times 70 \div 2{,}200 \times 50 = 8.25$ pounds wet bark.

It is seen, therefore, that 1,300,000 tons of wet bark are equivalent to 157,000 tons of coal, which at a value of $6 per ton represents a saving of $942,000 per year.

A reduction of the moisture by mechanical means to 55 per cent makes one pound of coal equivalent to 5.9 pounds of wet bark and means a total coal saving of 170,000 tons. In other words, a decrease of 10 per cent in moisture in the bark increases the saving of coal 8.3 per cent.

A further saving can be effected if the furnace can be so designed that the efficiency of burning bark containing 55 per cent moisture is raised to 70 per cent. One pound of coal is then equivalent to 4.2 pounds of wet bark resulting in a saving of 238,000 tons of coal representing a value of $1,428,000. Therefore, an increase of the efficiency from 50 to 70 per cent results in a saving of 68,000 tons or 40 per cent.

The cost of bark pressing equipment including the installation will vary with the capacity but averages about $4,000.

A liberal estimated operating cost for a press that will handle the bark from 100 cords of wood per day of eight hours is approximately as follows:

	Power at $36 per hp. year	Repairs per year	10% depreciation etc. per year	Total cost for year	Cost per day
10 hp. motor	$120	$80	$400	$600	$2.00
25 hp. motor	300	80	400	780	2.60

*Myers, D. M., Bulletin 1258 A. S. M. E.

This represents a cost of 2 cents to 2.6 cents per cord of wood. However, the usual bark press can be forced to 50 to 100 per cent over its capacity and the cost would be lowered in proportion.

It is evident, therefore, that after a reasonable reduction has been made in the moisture of the bark by pressing, the most fruitful line of attack for further increasing the efficient use of bark as a fuel will be to increase the efficiency of combustion by improved design and operation of the furnaces. The reports from the mills which have so courteously offered to the Committee their co-operation should go far toward further demonstration of the value of attention to these possible improvements.

BARK PRESSING TESTS

American Bark Press

The test was conducted at the Port Edwards mill of the Nekoosa Edwards Paper Company, October 5, 1922, and is supplementary to a similar test made August 28, 1922, and given in the First Progress Report, October 9, 1922.

The object of the supplementary test was to determine further efficiencies of the press in mechanically removing moisture from bark under conditions differing from those in the previous test.

Description of the Press—The same press used in the previous test was used and the conditions of operation were modified as follows: The counter-weights used on the levers on the first roll were 150 lb. instead of 125 lb. and on the second roll 174 lb. instead of 94 lb. The effective pressure on the rolls is as follows:

First roll	1st roll	2nd roll
Dead weight	800 lb.	800 lb.
Counterweight	3,000 lb.	3,480 lb.
Total weight	3,800 lb.	4,280 lb.
Pressure per inch width of the face	350 lb.	428 lb.

Pressing Tests—The test was divided into two periods of fifty minutes each. During the first period the bark pumped over in water suspension from the John Edwards mill was the only source feeding the press. The quantity of bark supplied to the press was not sufficient to completely cover the press conveyor at all times. During the second period thoroughly soaked bark was shoveled onto the conveyor to the press by hand and the bark was distributed on its way to the press. Under these conditions the press carried from 1½ to 2 inches of bark under the rolls continuously. Twice during the test the press stalled owing to irregularities in the feed otherwise there was no indication that the capacity of the press had been reached.

Character of the Bark—The bark pressed was from spruce which had been stored in the mill yard approximately 2 years. The logs were floated from the wood storage to the mill and the time in the water was estimated at from 2 to 4 weeks.

Sampling for Moisture—The bark was sampled for moisture before going to the press at frequent intervals. Samples of the pressed bark were taken from each wheelbarrow load of approximately 75 lb. dry weight. All of the bark was weighed on platform scales as in the previous tests.

Dates and Discussion—The following table indicates the results obtained in the test on the American Press:

	1st	2nd
Percent moisture in bark to press	73.7	70.1
Percent moisture in bark from press	52.4	56–58.2
Weight of dry bark (lb.)	613	1,875
Operating time (minutes)	50	50
Pounds of d. b. bark per hour	735	2,260
Pounds of b. d. bark per inch of width per hour.	73.5	226.0

Giant Nekoosa Bark Press

The test was conducted at the Port Edwards mill of the Nekoosa Paper Company, October 5, 1922.

The object of the test was to determine the efficiencies of the press in mechanically removing moisture from bark.

Description of the Press—The press was of the continuous operating baler type in which the plunger operated horizontally. The bark was forced into a square steel channel 12 inches in cross section inside measurement. The pressure channel was of uniform cross section for a distance of 26 inches from the hopper. The remaining 20 inches of the channel was flared slightly so that at the outlet the cross section measured 12¼ inches across. The bottom plate was flat so that the height of the opening was 12⅛ inches. The side and top plates of the pressure channel were steel and the bottom plate iron, thoroughly reinforced. All of the plates are perforated with holes ⅜ inch inside diameter and ⅛ inch outside diameter placed at 1¾ inches centers through which the moisture pressed from the bark is removed. A hopper is provided above the plunger which permits a continuous feed into the press with each stroke of the plunger. The plunger oscillates 34 times per minute and is driven by steel gears. The press is operated by a 25 hp. motor. The outlet of the press is provided with constriction plates one on each side which can be screwed in in order to increase the pressure on the bark.

Pressing Tests—The test was divided into 3 periods, one in which the sole supply of bark was obtained from the John Edwards mill; in the second period the feed was augmented by shoveling into the conveyor thoroughly soaked bark. The conditions in the third period were the same as the second period except that the outlet from the press was not constricted. In the first period the bark was flushed onto the conveyor with a large excess of water and a considerable stream of water passed into the press with the bark. During this period the outlet to the press was not constricted. The longer time which the bark had to remain in the press apparently being sufficient to permit of satisfactory removal of the water. During the second and third periods the amount of excess water was not so great although the bark was dripping wet. In the second period the press was operated without constriction. Sufficient pressure was not obtained, however, to thoroughly remove the water at the rate at which the bark was passing through the press. By constricting the outlet as in the third period no difficulty was obtained in reducing the moisture at will.

Character of the Bark—The bark pressed was from spruce which had been stored in the mill yard approximately 2 years. The logs were floated from the wood storage to the mill and the time in the water was estimated at from 2 to 4 weeks.

Sampling for Moisture—The bark was sampled for moisture before going to the press at frequent intervals. Samples of the pressed bark were taken from each wheelbarrow load of approximately 75 lb. dry weight. All of the bark was weighed on platform scales as in the previous tests.

Data and Discussion—The following table indicates the results obtained in the tests on the Giant Nekoosa press:

	1st	2nd	3rd		4th
Percent moisture in bark to press	75.0	72.3	72.3		74.0
Percent moisture in bark to press	49.2	48.7	54.2	59.2	49.6
Weight of dry bark (lb.)	151	...	...	...	...
Operating time (minutes)	25	45	9	21	30
Pounds of d. b. bark per hour.	362		2,980		

Further tests were made by representatives of the Fiber Making Processes Company and the three following representative tests on the American Bark Press are given:

SERIES 1

Load on bark by first press roll		3,700 lb.
Load on bark by second press roll		3,800 lb.
Apron speed in feet per minute—18⅛.		
Thickness of bark layer	1"	2"
Percent moisture in bark entering press	75.7	75.7
Percent moisture in bark leaving press	51.8	51.2

NOTE.—The apparent inconsistency of these results with those following is due to the refuse in the above tests being spruce bark only, while the refuse in the following tests contained a large percentage of slivers.

SERIES 2

Load on bark by first press roll			4,300 lb.
Load on bark by second press roll			5,700 lb.
Apron speed in feet per minute—18⅛.			
Thickness of bark layer	½ to 1"	1 to 1½"	1½ to 2"
Percent moisture in bark entering press	69.5	69.5	69.5
Percent moisture in bark leaving press	54.6	53.7	54.8

SERIES 3

Load on bark by first press roll			4,300 lb.
Load on bark by second press roll			5,100 lb.
A. Apron speed in feet per minute—18⅛.			
Thickness of bark layer	½ to 1"	1 to 1½"	1½ to 2"
Percent moisture in bark entering press	69.5	69.5	69.5
Percent moisture in bark leaving press	60.2	55.8	55.8
B. Apron speed in feet per minute—15.6.			
Thickness of bark layer	1 to 1½"	1½ to 2"	3 to 4"
Percent moisture in bark entering press	71.0	71.0	71.0
Percent moisture in bark leaving press	56.8	47.3	53.5

THE REDUCTION OF BROKE LOSSES

Supplementary Report of the Sub-Committee on Waste

By H. P. Carruth, Chairman;, F. J. Morrison, Robt. Herron

Broke in the paper industry is regarded as a necessary evil and for that reason many paper mill executives do not attempt to consistently analyze the causes but leave the whole problem to the operating departments. The farsighted mills, however, are continually studying this question in the attempt to reduce the amount of losses.

The control of broke losses on the paper machines is largely in the hands of the papermaker and he is the one who is mainly responsible. However, there are many other contributing factors such as the character of stock, condition and alignment of machinery, quality of felts and other things that need to

be co-ordinated with the actual paper making to obtain effective results. It is in this field that the technical man can be of assistance in the reduction of broke losses.

The greatest losses from broke occur in high speed news machines, in book and writing mills that further process their product and to a lesser degree in mills making bag and wrapping papers.

Newsprint Paper

The old saying that news is made in the ground wood mill is fundamentally true. The action of the stock on the wire is influenced to a large degree by the quality and character of the ground wood pulp which represents at least 75 per cent of the furnish. For this reason most operators pay a great deal of attention to the ground wood mill in order to produce the pulp that gives best results on the wire. Many plants have reduced the freeness test to its simplest form and have an inspector on each shift making tests every half hour on the pulp from the grinders. These tests indicate whether or not the stone is making the standard pulp and if it is properly dressed. Although the freeness or slowness of ground wood is one of the important factors there are other characteristics that can be traceable, perhaps to the original wood that are not yet fully controlled.

The second step in newsprint control is that of consistency and percentage of ground wood to sulphite. The consistency regulator is used extensively in modern mills. One plant has a regulator on both the ground wood and sulphite supply and the mixed stock goes through another one. The first two are aids to the proper proportion of stock and the third regulates the stock to the machine chest. The slush pulp system is largely used in the big news mills and the stock is measured and mixed in tanks. Several mills use measuring tanks to obtain the proper proportion of ground wood and sulphite. A number of large news mills are using the continuous mixing system with success, thus furnishing the supply of pulp in a constant stream.

The third important step in broke reduction is in the condition and operation of the paper machines. As the mechanical condition of the machine influences its efficiency of operation it is essential to know that every part is in good running order. The tension of the wire should be carefully regulated, all wire rolls and guide rolls should be in round and alignment and all tube and carrying rolls should be correctly lubricated so they will revolve freely.

The same fundamental conditions apply to the press, dryer and calendar parts of the machine. As the old saying goes "it's a poor workman that uses poor tools" therefore it is essential to have a smoothly operating machine so that the papermaker will be able to get quality and quantity production.

Book and Writing

The control in the manufacture of book and writing papers also begins with the raw stock. The measurement of slush pulp from the bleach plant can be effected by the use of consistency regulators to keep the concentration of stock constant and proper quantities are obtained by predetermined beater measurements or measuring tanks for volume. The use of lap or dried pulp simplifies the measurement problem if the material is correctly weighed and recorded.

The character and quality of the various pulps influence the action of the stock on the wire although this is somewhat offset by the treatment of the stock in the beaters and jordans. One mill has a predetermined time of beating for each grade of furnish and another uses an indicator to keep the beater consistency constant. A mill making another grade of paper regulates the degree of jordaning by the recording ammeter chart on the motor driven jordan.

The value of keeping the paper machine in perfect mechanical condition is more important than in any other grade of paper because both quality and quantity production are essential. The engineering department should make a careful examination of the paper machine every 4 to 6 months to keep the rolls in alignment, round up any flat carrying rolls and correctly level all rolls on the fourdrinier and press parts. One mill found it very advantageous to establish a standard crown for the press rolls. The density of the rubber roll is also of importance and affects both the quality of paper and the life of the felt. The alignment, leveling and crowning of the machine calendars is also very important.

The supercalendering of book and bond paper presents another source of broke loss that must be carefully watched. One book mill reduced this loss between the winders and calenders by the adoption of standard sets of iron cores on the machine winder for various width rolls. This helped to eliminate wrinkles and permitted more complete utilization of paper on the cores. Moreover, the reduction of wrinkles reduced the calender cuts. The correct weights on the supercalenders received considerable attention and the work of smoothing the calender rolls was assigned to a special man.

Damaged paper through careless handling and faulty storage can be reduced by providing good storage facilities, adequate handling equipment and standard methods of piling.

Excessive broke in the cutter department is often due to orders that do not work out in an economical manner. This is especially true in writing book and wrapping mills. Unsuitable orders in a news mill usually mean excessive trim loss which is reflected in production.

Records of Broke Losses

Many mills have found it profitable to have inspectors to test the paper and to check the product at different stages in the operation. Such practice provides a live and usable record of quality and quantity that assists in the production of a more uniform product.

Operating records placed before the machine crews are effectively used in many mills. A standard method of computing the "machine crew efficiency" has been adapted by a majority of newsprint mills. Many mills post the daily figures in the machine room and some show the percentages for each tour, resulting in a great deal of competitive interest.

The following suggested form could be adapted to book wrapping and similar mills and would analyze the time and production losses on the paper machine. The section regarding supercalendering would apply only to book and writing mills. A report of this kind may be figured, daily, weekly or monthly. The assumed figures are on a monthly basis.

PAPER MACHINE OPERATING REPORT

	Hr.	Tons	%
1. Possible operating hours	600	....	....
Time lost due to:			
(a) Major breakdowns	15	....	2.5
(b) Power	9	....	1.5
(c) Other causes	...	....	....
(Losses usually outside the control of the machine crews.)			
2. Actual operating hours	576	....	96.0
3. Possible production hours	...	1,728	100
Note—Assumed capacity production of 3 tons per hour.			
Losses due to:			
(a) Changing felts, wires, etc	10	30	1.74
(b) Washups	20	60	3.47
(c) Machine broke (weighed)	...	86.4	5.0
(Losses which can be controlled by the machine crew to a large degree.)			
4. Actual production	...	1,551.6	89.79
(Machine efficiency.)			
5. Possible trim	150"		
6. Actual average trim	140		
7. Percent trim loss	6.67		
8. Actual average speed	500		
9. Actual average basis weight	50.5		
10. Percent over or under basis weight	1.0 over		

SUPERCALENDER OPERATING REPORT

11. Possible production		1,551.6	100
(a) Broke loss		40.0	2.58
12. Actual production		1,511.6	97.42
(Calendering efficiency.)			
Note.—Moisture loss or gain should be taken into consideration.			

REWINDER OPERATING REPORT

13. Possible production	
(a) Broke loss	
14. Actual production	
(Winder efficiency.)	

CUTTER OPERATING REPORT

15. Possible production	
(a) Broke loss	
16. Actual production	
(Cutter efficiency.)	

The broke losses in the paper mill show a great variation in different plants. Figures from a large number of news print mills show a total loss of wet and dry broke ranging from 2½ per cent to 12 per cent. This figure is obtained by computing the difference between the theoretical and the actual production of each machine. A 4 per cent broke loss is considered a very good attainable figure.

The total broke losses in a book mill may vary from 15 to 30 per cent because of the several operations and 12 per cent overall loss may be considered as a possible attainable figure with good orders and operation. The losses on the paper machines, cutters and rewinders are about equally divided while the calender losses may be smaller than in any other department.

In order to bring the machine losses to the attention of both the executive and operator more strongly it is possible to translate the time lost to dollars and cents by using an average figure of operating cost per hour. The tonnage losses can be emphasized by showing what it costs to rework broke stock and reconvert it to paper.

Another effective method of illustrating the added expense due to broke is to include the figures in the cost statement as

an explanatory record. The total of the conversion cost figures of the different processes indicate the wasted effort for each ton of broke and the average cost of bringing it back to the same point as good paper.

CONVERSION COST OF PAPER—PAPER MACHINES

	Tons	
Weight of material furnished	672	
Material shrinkage 2.5%	16.8	
Paper machine broke 8.2%	55.2	
Weight of paper made	600.0	
	Cost	Cost per ton
Total paper machine conversion cost	$13,500	$22.50

SUPERCALENDERS

	Tons	
Weight of unsupercalendered paper furnished	600	
Supercalender broke 4%	24	
Weight of paper supercalendered	576	
	Cost	Cost per ton
Total supercalender conversion cost	$3,456	$ 6.00
Conversion cost (machines and calenders)		28.00

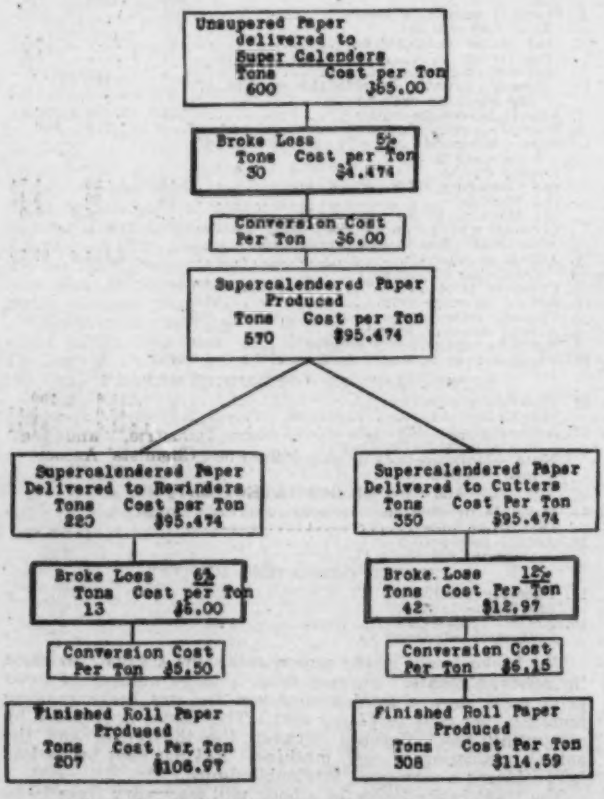
When the conversion cost alone is used it is unnecessary to consider the return value of the broke. The cost per ton indicates the average cost that is expended on each ton of broken paper as follows:

	Per ton	Total
Papermachine broke 8.2 per cent, 55.2 tons	22.50	2,242.00
Superheater broke, 4.0 per cent, 24 tons	28.50	684.00

The average conversion value for rewinder, cutter and finishing broke can be used in the same way.

Cost Records and Broke Losses

The accompanying chart, reproduced from the Progress Report presented at Detroit, shows the method used by one


Unsupered Paper delivered to Super Calenders
Tons 600 Cost per Ton $65.00
Broke Loss 5%
Tons 30 Cost per Ton $4.474
Conversion Cost Per Ton $6.00
Supercalendered Paper Produced
Tons 570 Cost per Ton $95.474
Supercalendered Paper Delivered to Rewinders
Tons 220 Cost per Ton $95.474
Supercalendered Paper Delivered to Cutters
Tons 350 Cost Per Ton $95.474
Broke Loss 6%
Tons 13 Cost per Ton $5.00
Broke Loss 12%
Tons 42 Cost Per Ton $12.97
Conversion Cost Per Ton $5.50
Conversion Cost Per Ton $6.15
Finished Roll Paper Produced
Tons 207 Cost Per Ton $106.97
Finished Roll Paper Produced
Tons 308 Cost Per Ton $114.59

Cost chart indicating increased cost due to broke

concern, making a standard grade of book paper continuously, to incorporate the broke losses into the cost reports. The principal objection is that it is not adapted to an order cost system because no provision is made to credit back the broke and for this reason it shows an exaggerated figure. It does show an amount that can be termed as the indicator of increased cost due to broke. It is extremely simple, an effective figure to use in the discussion of broke losses and has been instrumental in showing results.

Any losses or increased cost per ton indicates a reduced return on the product that one department delivers to another, although the total cost remains the same.

Conclusions

The salient points in the problem of reducing stroke losses in the paper mill may be outlined as follows:

1. It is almost universally true that the papermaker with his experience in effectively handling the equipment and stock is the most important factor in reducing broke.
2. Control of the consistency, freeness and character of stock as well as the correct furnish percentage and measurement of material are essential.
3. The mechanical condition of every integral part of the paper-making machinery is a large contributing factor in broke losses. Periodical inspection is valuable in order to keep the machinery in perfect running condition.
4. Operating records have proved very effective in many mills and when properly presented to the machine crews usually result in better quality and higher efficiency.
5. The conversion or manufacturing cost is an effective instrument to emphasize the importance of broke losses to both the operating men and the management. Interest is created and results are obtained by placing cost information in some form before the men who make the product.

REPORT OF THE JOINT FELT COMMITTEE

By George H. Harvey, Chairman

Your committee begs to report that it has had several very interesting meetings and that all of the members have met with splendid co-operation in their efforts to gather information regarding the manufacture and use of papermaking felts.

One of the first things undertaken was the preparation of a uniform data sheet on which could be listed valuable information regarding the paper machines. With the help of these data sheets it is possible to analyze the abrasive action and other effects of suction rolls on the felt as well as to study the effects of suction boxes, whippers, guide and spread rolls and other appliances.

Data Sheet

With very few exceptions, the paper mills throughout the country recognize the value of this data sheet and a great number of them are co-operating with the Felt Committee by supplying the felt manufacturers with the information called for.

The use of this data sheet may not produce immediate and startling results, but the committee believes that continued work in this line will eventually prove it to be a forward step. The data already in the hands of the felt manufacturers are assisting them greatly in making more reliable felts better designed to meet the conditions imposed upon them.

Some of the felt manufacturers are spending a great deal of money in their research work on the factors influencing the life of a felt. They are making a critical study of the processes of manufacture and of the materials used in an effort to produce a felt that will remove the greatest amount of water from the paper without causing marking, crushing or blowing.

Felt Stresses

Considerable work is also being done in the investigation of felt stresses while running on cylinder paper machines. Methods of washing and cleaning felts while on or off of the machine, as well as the care of felts in storage, are also being given attention.

The results of all this work will be given to the general trade as soon as it is possible to do so, and we believe that every mill using felts is now deriving some benefit from what has already been done.

REPORT OF HEAT, LIGHT, AND POWER COMMITTEE

By H. S. Taylor, Chairman

Your committee's activities for the past year have not been extensive. The tentative program for the fall meeting held in Detroit was arranged early in the year, but it was later decided that this committee would not actively interest itself in the fall meeting, but would, in as far as possible, co-operate with the Waste Committee.

Such a policy was carried out, the members of the Heat, Light and Power Committee entering into such discussions as were brought up at this committee's meeting.

During the last day of the Detroit convention your committee held a meeting and a program was arranged to be given at a sectional meeting being held during the spring convention in New York. This program consisted of three papers, but at this writing but two papers have been presented, entitled "Heat Transference in the Ventilation of Machine Rooms," by J. O. Ross, and "Records of Steam and Electricity in a Paper Mill," by E. P. Gleason.

The past year has shown a steady progression to more normal activity in our industry, but while volume of produc-

tion is steadily increasing, costs are increasing also, and the margin of profit is such that it behooves manufacturers to pay the strictest attention to each little economy in power plant and mill in general, for under present conditions such economies may mean the difference between profit and loss. The transference of heat as exhausted from machine rooms is a subject that has been given much attention lately, for the actual loss in heat units through the exhaust system of the average machine is a goodly percentage of the coal pile, and while the appearance of a cloud of vapor about the machine room roof does not perturb the operator, the actual disappearance of the coal pile is of vital importance, and I have asked Mr. Ross to tell you how this heat can be transferred to the incoming air and thus save a corresponding amount that would otherwise be duplicated from the coal pile.

In passing my office of chairman of the Heat, Light and Power Committee on to my successor, I wish to thank the members of our Association for their support during the years that I have held office, and I wish also to thank, especially, our president, George E. Williamson, and secretary, W. G. MacNaughton, for their assistance whenever and wherever such a need arose.

The possibilities of this Heat, Light and Power Committee as an aid to the manufacturer are unquestionable, but more time must be given to the committee's work than can be supplied by the average member. The real work of this committee is yet to be done, and I sincerely trust the Heat, Light and Power Committee of 1923-1924 will show how much more can be done than has so far been attempted, and I wish them every success for the year, or years, to come.

REPORT OF THE COMMITTEE ON CELLULOSE

By W. E. Byron Baker, Chairman

The report of the Committee on Sulphite Pulp as submitted to the Association last year at the annual meeting, expressed a suggestion that the formation of a committee on cellulose would be very desirable because of the fact that such a committee would be the logical one to deal with such problems of cellulose constitution, properties, and the factors in the preparation which govern to an extent these properties, and the adaptability of the various commercial cellulose and pulps to conversion into the various grades of paper and other allied manufactured products. It seemed clear that the subject matter of the work of such a committee would not fall within the scope of the activity of the Committee on Sulphite Pulp, nor of either the Committee on Soda Pulp or the Committee on Sulphate Pulp, and it was further evident that much of the work of the cellulose committee would be of equal interest to those engaged in the manufacture of either of the three above mentioned commercial pulps.

Committee Appointed

For the above reasons, about two months following the last annual meeting, a Committee on Cellulose was appointed, and some plans for getting some work under way were considered. It was soon evident, however, from the nature of the work involved and the nature of the subject, that the only effective way to start was by holding a symposium on cellulose at the earliest opportunity in connection with a meeting of the Technical Association. While there was some hope of arranging some such meeting in connection with the autumn convention held last year in Detroit, plans along this line did not materialize, and the matter was held over for this annual meeting.

Symposium

The symposium which will be held at this meeting will have several objects. Several papers on subjects related to cellulose will be presented and discussed, as listed on the program. These promise to prove very interesting, and it is hoped that this part of the symposium alone will warrant a good attendance. Another phase of the symposium work will be the discussion of and the eventual agreement upon the exact amount and nature of work to be dealt with in the coming year. It is hoped that the interest of the chemists in the leading pulp mill laboratories may be enlisted, and that these chemists in their respective laboratories will find it agreeable to co-operate in the coming year with the committee in the testing of certain methods of examination and analysis of pulps, particularly in respect to their content of the various types of cellulose and associated bodies, and lignin remaining as a residue, with the purpose in mind of eventually adopting certain procedures and methods as standards. Every pulp and paper chemist will readily recognize that this does not constitute a small task, particularly if he considers that in 1920, when the German Pulp and Paper Chemists took up the problem of cellulose determination, no less than 29 distinct procedures were investigated. Incidentally, the report of this work and the other work of the members of the "Faserstoff-Analysenkommission," found in Volume 13 of the publications of the German Pulp and Paper Chemists, merits our conscientious attention as an association of chemists as well as a committee.

Colloid Chemistry

The consideration of cellulose from the point of view of the colloid chemist will also receive some attention at the symposium. One of the members of the committee, Dr. Jessie E. Minor, will discuss this phase of the subject matter, and will correlate some of the results of her work along these lines with the results of various other well known investigators. It is because of the fact that in the papermaking art cellulose comes into play as a complex colloid, as contrasted to a simple chemical individual, in the form of the various types of commercial pulps, that this aspect of the subject should prove of interest. It is the colloid properties of cellulose which make it valuable in the manufacture of paper.

Recently several inquiries have been received and some interest has been shown in the use of certain analytical methods as applied to pulps. Among these may be mentioned the determination of alpha, beta and gamma cellulose present, the determination of residual lignin, the determination of bleaching characteristics of pulp, the conduct of the pulp toward oxidizing agents as a means of evaluation for certain uses, and as a means for process control in pulp manufacture, means of determining the beating characteristics, the microscopy of pulp fibers, etc.

Constitution of Lignin

The question of the constitution of lignin also falls within the scope of the activities of the committee, because of the close relationship and association of lignin and cellulose in the wood, and the resulting importance of an at least partial knowledge of this subject in the proper preparation of the most satisfactory pulp for any given purpose. It is quite certain that when the constitution of lignin is better understood, that the reactions which take place in the cooking of pulp by the various processes will also be better understood, with the result that the technical control in the industry will be made more effective and will be more simplified. Better products will be made in a more profitable manner.

Recent Literature

Certain literature on the subject of cellulose has been examined, and will be considered and discussed in a general way at the symposium. It is really regrettable that the English literature on the subject is not more copious. Cross and Bevan's "Cellulose" and "Researches on Cellulose" still seem to be the most comprehensive sources, although there is no doubt that a considerable amount of literature will soon result from the work of the Cellulose Section of the American Chemical Society. The papers already published by Dr. Hibbert and others are quite noteworthy. The leading foreign literature is in German and Swedish. The most comprehensive work is Schwalbe's "Die Chemie der Cellulose." Other closely related books are "Schwalbe-Sieber—Die Chemische Betriebskontrolle in der Zellstoff und Papier Industrie," and the volume 13 of the German Pulp and Paper Chemists' Association, referred to above. The publications by Prof. Dr. Klason, some of which have appeared in English translation, and others of which will soon appear, are very valuable, particularly on the subject of lignin. Very valuable in the study of cellulose is the quite recent and modern publication by Dr. Emil Heuser entitled "Lehrbuch der Cellulosechemie." The recent work of Schmidt and Graumann on cellulose determination by chlorine dioxide is worthy of mention and discussion, because it is claimed to overcome many of the difficulties and drawbacks of the previous methods, and because it is also claimed to open up a new approach to the problem of the constiution of lignin.

Greater Interest Hoped For

It is hoped that the proper amount of interest will be manifested in the subject of cellulose and the work of the Cellulose Committee, and that the committee may have the hearty co-operation of the chemists in the mills in the coming year.

The Committee on Cellulose is composed of R. H. McKee, George Barsky, R. N. Miller, Jessie E. Minor and W. E. Byron Baker, chairman.

REPORT OF COMMITTEE ON MECHANICAL PULP

By W. A. Munro, Chairman

The Committee on Groundwood attempted during the past year to find out how much influence the different types of burrs used had on the grade of stock produced. To do this we sent a questionnaire to nearly all the groundwood mills in the U. S. A. and Canada, and received much interesting information. This was tabulated by the committee and will be presented and discussed at the sectional meeting tomorrow.

We also went into the effect of the use of white-water on

freeness of stock used in newsprint manufacture, and its action on a paper machine. This paper was supplementary to the work of the Committee on Waste and fully covers the use of re-water and its effect on groundwood.

We have asked several people interested in the operation and manufacture of different types of grinders to compare the relative cost for labor, overhead, repair and upkeep between these types, and to indicate the definite limits for the magazine grinders as compared with the pocket types.

The manufacture of groundwood during the past few years has been developed along much more scientific and technical lines than ever before in the history of the industry. This development has been along two fairly distinct lines—one, that of manufacturing more economically from the payroll point of view, and the other that of manufacturing efficiently from the point of view of maximum yield and uniformity.

The development from the economic side has resulted in the installation of larger units, or increasing the power to a unit. In older installations three pocket grinders were formerly driven by 300-400 hp., and five and six tons to a stone was considered sufficient production. The tendency lately has been to raise the power per grinder from 450-600 hp., and to install either four pocket grinders or to increase the size of the stone and in this way to increase the production per man-hour.

A considerable number of large new grinder installations are of the magazine type. This type reduces the number of men used to a minimum, and the production per unit is higher with this type than with any other.

During the past year a new type of magazine grinder, the Chainfeed, has been put on the market, that does away with several objectionable features of the older or pocket type of magazine grinder. By means of the constant feed of the chain type, the motor load is practically constant; there is no variation in pressure of grinding, hence a more uniform grade of pulp.

The screen rejections that formerly helped fill up the river are now being given much attention, and different treatments according to the use they are to be put to.

In the manufacture of wrappers for shipping rolls, they go direct to the paper machine without much refining. In the case of insulite, a board made entirely of groundwood rejections, some refining is done, especially if a dense board is required.

The refining of screening for re-use as No. 1 pulp has brought into use two new refining engines, entirely different in design and principle, both giving satisfactory results, and tending toward an absolutely closed system in groundwood manufacture.

The freeness-slowness tester has come into general use in progressive mills and is a valuable way to determine quickly and accurately the nature of the stock. By means of frequent tests the groundwood can be kept uniform and more satisfactory results obtained, especially on high-speed machines where variations in stock cause considerable trouble.

The committee feel that an attempt should be made to standardize all freeness testers and the procedure of testing so that when one hundred test stock is referred to, a certain known grade of stock is meant. We feel that this would be of especial value to mills which purchase a large quantity of groundwood yearly, and which now have no control over the manufacture. We would like to suggest that an effort be made in the next year by the Groundwood Committee and the Committee on Standard Methods of Testing Materials, to work out a procedure and standard tester, that at the next meeting the Technical Association may act on it, and recommend it to the industry if it so desires.

Committee on Vocational Education Report

R. S. Hatch, chairman, reported for the Committee on Vocational Training, and supplementary reports were submitted by J. N. Stephenson, of Montreal, editor of the Technical Association text books on papermaking, and by B. T. McBain, assistant general manager of the Nekoosa-Edwards Paper Company, Port Edwards, Wis., who talked on vocational training from the executives' standpoint.

The afternoon meeting was devoted to the report on waste and discussion of same, and the report on paper drying and discussion. The Wednesday sessions of the association were given over to the reading of various interesting papers, some of which are printed in this issue of THE PAPER INDUSTRY.

An interesting talk on how his company has developed a system of "promotion from within" was given before the meeting Wednesday by Henry P. Carruth, general manager of the Mead Pulp and Paper Company, Chillicothe, O. Mr. Carruth said that the first requirement in developing a system of promotions was an analysis of the duties and relative responsibility of the men in every job in the mill. Each man's worth, as determined by his position, the number of men under him if any, the value to the company of his efficiency, or the damage possible through inefficiency, is arbitrarily determined, and a wage rating assigned in accordance with his value, this analysis going through the entire plant.

After the analysis is made, men throughout the mill are allowed to apply for examination in their particular branches, these examinations being oral and practical. The man who passes the examination with a sufficiently high mark is then given an official rating as being a man of a certain title, such as machine tender, beaterman, etc., and is then available for a try-out in the next higher position when there is a vacancy. After try-out, he can take examination and be officially given the higher rating which he has earned.

The results, Mr. Carruth said, were manifold, in increasing efficiency, avoiding labor turnover, and putting a personal interest in the job on the part of every man. The men are allowed to purchase stock in the company.

Annual Dinner

The annual dinner of the Technical Association was given at the Hotel Astor, Tuesday evening. About 225 members and guests were in attendance, including a good many ladies, there being a larger number of ladies than at any dinner given by the association in the past. The entertainment program, which was in charge of F. T. E. Sisson, included a lady vocalist who rendered several selections accompanied by piano and violin; a string orchestra, which played both classical and popular music, and the diners joined in singing many of the oldtime and popular melodies, song books being distributed for this purpose.

In the absence of Judge Charles F. Moore owing to illness, President Williamson acted as toastmaster. Mr. Williamson read a letter from Judge Moore in which the latter expressed his regret for not being able to be present and extending good wishes to members of Tappi.

The first speaker was Dr. Otis W. Caldwell, Director of the Lincoln School, who spoke on the subject of "Education for Modern Life." Dr. Caldwell touched on the newer ideas in getting education and the deadly methods of the old educational system, pointing out that the plan in practice today was to obtain the interest of the pupil or student and to hold his interest while teaching him. He dwelt at considerable length on the necessity of selective education for fitting the student for modern life.

H. S. Person, president of the Taylor Society, chose as his subject the "Opportunities and Responsibilities of Technical Men," and emphasized the two main thoughts of the great opportunity afforded the technical man in industry today and the responsibility of the technical man in effecting the needed improvements in industry.

Royal S. Kellogg, secretary of the News Print Service Bureau, gave a humorous skit illustrated by drawings on a blackboard emphasizing the necessity of the apprenticeship system in industry. He cited some amusing instances of the lack of knowledge of simple arithmetic found among mill workers, which caused a great deal of laughter among his listeners.

L. W. Wallace, Executive Secretary of the Federated American Engineering Societies, spoke on the "Elimination of Waste in Industry," and discoursed at much length on his subject.

An enjoyable social event of the Technical Association convention was the smoker given at the Canadian Club on Monday evening. About 75 were present, and informal talks were given by President Williamson, Henry W. Stokes, Dr. Baker and Secretary MacNaughton.

Salesmen's Association Meeting

THE annual meeting of the Salesmen's Association of the Paper Industry was held in the East Room of the Waldorf-Astoria Hotel, New York, on the morning of Tuesday, April 10, with President H. H. Reynolds presiding. Following the usual business transactions, a new administration was elected for the ensuing year. J. I. Fearing, western manager for the International Paper Company, with headquarters in Chicago, was elected president, succeeding Mr. Reynolds, who held the office of president for two terms. Other officers chosen were:

Vice President for the New England District—Walter E. Perry, of the Chemical Paper Manufacturing Company, Holyoke, Mass.

Vice President for the New York District—R. D. W. Ewing, of the American Writing Paper Company, New York City.

Vice President for the Chicago District—Ray Russell, of the Marathon Paper Mills Company, Chicago.

Vice President for the Miami Valley District—Robert B. Houk, Jr., of the Mead Pulp and Paper Company, Dayton, O.

Mr. Reynolds in his annual address reviewed the work of the association for the year, and made a number of suggestions aiming to increase the service and assistance of the organization to its membership.

Secretary-Treasurer Hugh P. Baker reported as follows:

Secretary-Treasurer Baker's Annual Report

The Salesmen's Association a Recognized Factor in the Paper Industry. The past year in the work of the Salesmen's Association has been a year of unusual progress. This progress is not as evident to you men, scattered as you are about the country, as it has been to your officers. This progress has been the achievement of a definite place in the industry, evidenced by a gradual move forward from a period of uncertainty and indefiniteness to a period of definite opportunity and definite acceptance by the industry.

The regular luncheons held by our various groups in Chicago, New York and Boston, and the special luncheon last Fall in Chicago, and the dinners held in Springfield and New York City, have been the cause, largely, of this definite turning away from the fog of uncertainty to open recognition of the value of the work of the Association not only among our members but among the executives. It seems to me, as Secretary, that this recognition of the Association by the industry completes the first stages of our development, and opens to us opportunities which, though we have appreciated them, have been intangible and apparently too difficult of real accomplishment.

Membership. This simple fact that through the past years of uncertainty in our organization we have been able to hold our membership, and even in the face of resignations we have been able to increase the total membership, has shown that the Association has been very close to the hearts of a number of members in each of the districts, and evidences conscientious hard work on the part of those who have led in our different districts.

Applications have been coming in steadily in the last six months, resulting somewhat from the very successful annual luncheon at Chicago, and the dinners here in the East, but really coming as the result of the very definite acceptance of the association, already referred to.

There are, of course, a good many salesmen representing manufacturers and converters in the country who are qualified for membership and who will be brought in the coming year or two. The fee charged is not a large one, and with better times returning there will be a growing tendency on the part of companies to take care of these fees for their salesmen. We have talked in the past of membership campaigns, and there has been real work done, yet I feel that we are just now ready for an aggressive membership campaign that will make our Association gradually representative of the salesmen of the industry.

Your officers have been preparing the ammunition for a membership campaign, and yet through the period of depression and in the months of uncertainty following the depression it has not seemed timely to carry through a campaign that will really accomplish what we expect from such a campaign.

There are enough salesmen in the industry representing manufacturers and converters to back an organization which should and can support a paid secretary, who in a sense would be an organizer, in that he would spend several weeks in each of the districts, getting in new members by personal calls and conferences.

Constructive Work Essential to the Future of the Association. Constructive work has been done by the Association in the luncheons and dinners referred to above. There must, however, be more constructive work if the Association is to function as we all believe it must function in the industry. In a way we lack the opportunities for constructive work which have been seized upon and used advantageously by the Technical and Superintendents' Associations. Their problems are much more definite and the results of their work can be made more apparent to the executives of the industry. Nevertheless, there is work that can be done by our Association, to the very great advantage of the entire industry.

There are two sorts of constructive work which we might take up to very great advantage. First, work that will strengthen our individual membership. Such work we have already been doing in the developing of morals and in the keeping of our Association on a very high plane in its activities. More can be done along this line. Acquaintanceship among our members, is of course a real accomplishment. Doubtless, a good deal could be done through having opportunities for either correspondence courses or definite series of contacts by men of recognized training in salesmanship. This is a field that will stand a good deal of extension and may result in great good to us.

The second line of constructive work is the carrying through of a campaign to increase the use of paper, and this will be touched upon by one of the speakers, today. Another activity along this line might be the formation of a bureau within the Association to increase the knowledge of the industry of foreign conditions and foreign markets generally. We have really just started service as far as development of foreign trade for our industry is concerned. As you doubtless know well, many of our manufacturers feel that there is nothing in foreign trade for them. However, when we know that we exported paper and paper goods to the value of over $80,000,000 in 1920, and over $25,000,000 in 1922, it is apparent that our foreign trade does mean something to us and that it can be developed.

Picture taken at Annual Dinner of Salesmen's Association of the Paper Industry, April 10, 1923, Waldorf-Astoria Hotel, New York

It is my feeling that this Association could function as the domestic and foreign sales promotion department of the entire association group, and that to the very great advantage of the industry. We are all convinced that only as we can do work that will mean dollars and cents to the executives will we be meeting our real opportunity as an organization. Knowing this, I am sure that we have both the brains and the energy to work out constructive plans that will make for the upbuilding of the industry.

Dr. Warren M. Persons, of the Economic Research Committee of Harvard University, addressed the meeting on the subject of "Recent Developments in the Paper Industry," and was followed by Lawrence W. Rogers, Professor of Applied Psychology at New York City College, who spoke on "The Service Factor in Selling." F. J. Ross, of F. J. Ross, Inc., New York City, spoke on "Advertising an Industry," and the meeting was closed by a general discussion on "What's Ahead for the Association" led by J. I. Fearing.

Annual Dinner

The annual reception and dinner of the Salesmen's Association was given at the Waldorf, Tuesday evening, at which the principal speaker was United States Senator Pat Harrison of Mississippi. The Senator, in commenting on President Harding's plan for a World Court, said, in part:

"And tardy and belated as the suggestion is (it would have been much better two years ago), I can pledge to the President that in the Senate of the United States there will not be a half dozen Democrats to cast their vote against our entrance into that court. I hardly think there will be more than two. Certainly not more than three."

Senator Harrison said that what he wanted to see the President do in his itinerary was not to go into the States where the Senators were in favor of the court, but into those States where the opposition was strongest. "I would have him go into Connecticut," he said, "and start a backfire against Brandegee, and into Massachusetts, the stronghold of George Moses, and into Idaho, that State whence comes my old friend Bill Borah, who talks to you the night after tomorrow."

Discussing the reforestation of lands in the South and West, Senator Harrison said:

"I am glad to report to you that the Senate Reforestation Committee has gone far enough in its investigation to insure you greater aid and co-operation upon the part of the Federal Government than has heretofore been manifested in solving this great problem. Already people in the South are utilizing the waste from the tops and limbs and surplus timber material in the manufacture of wood pulp."

Dr. Henry Clay Risner, of Hoboken, N. J., spoke on the subject of "Co-operation or Competition—Which?" Dr. Risner urged a better feeling among competitors in business, competition of a co-operative rather than of a nature which competition is usually construed.

Ladies attended the dinner, and between courses there was dancing. Following the speeches dancing was resumed and continued until midnight.

Woodlands Section Meeting

THE annual meeting of the Woodlands Section of the American Paper and Pulp Association was held at the Waldorf-Astoria Hotel, New York, on Wednesday, April 11, morning and afternoon sessions being held. Following the transaction of routine business, with Chairman C. W. Hurtubis, of the Hammermill Paper Company, Erie, Pa., presiding, the election of officers took place which resulted in the re-election of Mr. Hurtubis as Chairman, and of George N. Ostrander, of Finch, Pruyn & Company, Glens Falls, N. Y., and J. E. Alexander, of the Nekoosa-Edwards Paper Company, Port Edwards, Wis., being elected vice chairmen. O. M. Porter was re-elected secretary and treasurer.

The Executive Committee chosen consists of Chairman Hurtubis, E. A. Sterling, of James D. Lacey & Company, New York City; Royal S. Kellogg, of the News Print Service Bureau, and D. E. Lauderburn, of the Pjebscot Paper Company, Brunswick, Me.

An interesting program of addresses and talks was given at the morning and afternoon meetings.

The following report of the Forestry Committee was submitted:

REPORT OF THE FORESTRY COMMITTEE

O. M. Porter, Secretary

Introduction

The pulpwood supplies of the United States are limited. Intensive methods and utilization of new species are necessary now on the part of American paper manufacturers to avoid drastic action later as regards their supplies of available pulpwood.

We import about one sixth of our annual consumption of pulpwood, and probably not less than one fifth of the pulp used in this country. Foreign importations have increased very rapidly within the last few years, but both Canadian and European consumption of wood pulp, for their own domestic manufacture of paper, will inevitably increase. This will reduce the exports to the United States, and will mean that we will of necessity have to produce our own wood pulp.

The result of all this will be that the paper industry of the United States will come to its foresters for advice as to the most practical methods, not only of protecting the timberlands which they own, but also, and perhaps more especially, of increasing their productivity. The following report is a preliminary attempt to anticipate that demand, with constructive suggestions from the foresters and woods men of the paper industry.

Objective

The development of recommendations covering the application of practical forestry methods to the woods operations of the paper industry.

Organization

The Forestry Committee was divided into sub-committees representing the pulpwood forest regions of New England, New York and the Lake States. As each of these sub-committees has handled different phases of the problem, their reports are given separately in detail, as follows:

A—Report of the New England Sub-Committee

"A Forestry Policy for Paper Companies"

1—**Adoption of the fundamental conception of Continuous Forest Production.**—Desirable, but not entirely essential; as for example, where foresters endeavor to conserve and develop the sale value of cut-over land by adequate re-seeding and fire prevention, under policy of liquidation or amortization.

2—**Acquisition of land.**—Of fundamental importance. Amount based on annual pulpwood consumption, location of mill, transportation facilities and costs, and local considerations of exploitation and protection. Buy land for permanent investment, and pulpwood for present supplies.

3—**Inventory.**—A general reconnaissance with outline maps to determine approximate quantities and relative values, to be followed by intensive mapping and cruising for timber sale or logging operations.

4—**Fire Prevention.**—Absolutely essential. Co-operation with local, state and federal fire protective systems and educational organizations or agencies. Develop local interest and sense of responsibility.

5—**Logging Operations.**—Application of the essence of forestry—Conservation by Wise Use. Emphasis on natural reproduction of desirable species, with spruce on spruce land. Location of cutting areas, preparation of logging plans and inspection. Essential co-operation with logging boss or local superintendent. Knowledge of logging costs extremely important.

6—**Growth and Yield Studies.**—First, know what you have, and then what the land is producing. Necessity for conservative estimates. Plan for normal growth of mill's output, as well as for development of holdings on sustained yield basis, if possible.

P. T. Coolidge, Bangor, Me., Chairman.
E. S. Bryant, Boston, Mass.
D. A. Crocker, Eastern Mfg. Co.
D. E. Lauderburn, Pejepscot Paper Co.
H. B. Morse, Orono Pulp & Paper Co.

Following are suggestions by Edward S. Bryant, Consulting Forester, and member of the New England Sub-committee:

"It seems to me that the logical steps for a pulp company wishing to use a forester are, first, to send him out as a 'go-look-see' man to make a preliminary examination of their whole timber proposition and report where it is, what it is, and what they should do with it. Then he should undertake a boundary, topographic and timber survey, in most cases with some slight attention to rate of growth, but more attention to health and availability for logging. At the same time, or following this, he should examine the existing logging and seek to improve it as regards—

1—Waste in logging (stumps, tops, skids, bridges, logs and landings left.)

2—Cost of logging (due to method logging, hauling, driving, etc.; location of camps, roads and improvements in relation to the location of timber.)

3—Fire protection (including a lookout system, patrol, telephone, etc.—if necessary, but very seldom on account of the expense—and slash disposal except through utilization and top logging unless bodies of immature timber can be left green and untouched as fire breaks.)

4—Utilization of poorer grades of timber and unused species.

"After all these things are well in hand, detailed working of trees to be cut and studies on rate of growth, scaling, logging costs, and especially the fundamental engineering data for detailed logging analysis and plans (i e. grades—maximum, minimum and optimum—for each kind of skidding, hauling, sluicing, fluming chute), best types and costs of construction of apparatus and tools, and finally studies on—

1—Improvement of present reproduction already established (by release cutting, thinning, logging overwood, etc., with a view to determining costs and results of each treatment that seems practicable and best adapted to conditions).

2—Type of cuttings required for natural reproduction, if practical.

3—Costs and results of artificial reproduction—if desired by company—under different conditions."

B—Report of the New York Sub-Committee

"Growth Studies and Cutting Regulations"

This topic, in itself, is two-fold and will be taken up that way. The subject of **growth studies** is of primary importance to the pulp and paper company embarking on or considering a policy of continuous production on its lands, since on it depends whether the growth is sufficient to meet the needs of the mill at present and as these needs increase. The study of growth rests upon a thorough inventory of the timber properties—and of the mill property as well.

Instead of theorizing on this subject, your sub-committee prefers to present a concrete case of such a growth study which is about to be undertaken by one of the leading paper companies in New York State. This company has for ten years or more been handling its lands on a constructive basis but has never studied in detail the growth on its timber properties as the decisive factor in the acquisition of more land, or the buying of pulpwood for present supplies. The study is to yield information as to the average annual growth in cords per acre and is to be in such form as to be readily comprehended by company officials who are not technical foresters.

At a **preliminary conference** held during the winter, the situation was carefully reviewed and a plan for the growth study prepared. This involved, first, the compiling of all germane data in tables and in maps. The data to be assembled before the beginning of field work include—

1—Classification of area into forest types.
- a—Barren
- b—Water surface
- c—Mixed hardwood type
- d—Spruce flat type
- e—Spruce slope type
- f—Swamp type

2—Location of these types on maps of forest property, further subdivided into condition as to whether—
- a—Cutover within 5 years
- b—Cutover within 10 years
- c—Cutover within 20 years
- d—Cutover within 30 years
- e—Cutover more than 30 year ago
- f—Virgin.

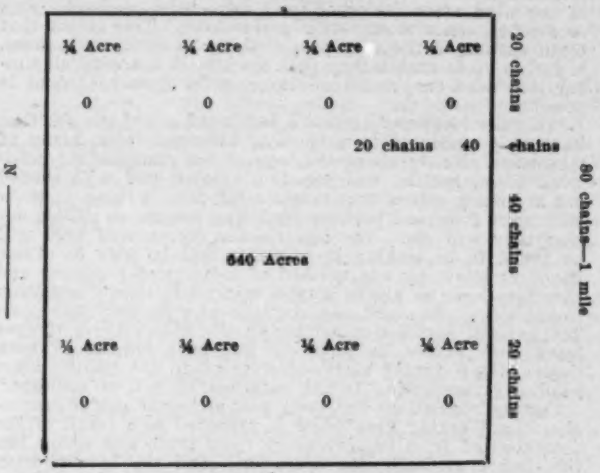
3—These data to be in such shape they can be used so that the field parties may be intelligently directed to a definite locality for the growth study of a particular type and condition.

The actual plan of field work rests on the selection of sample quarter acre plots equi-distant and proportionately allocated to the type and condition. The method outlined below was first proposed by E. F. McCarthy and W. M. Robertson in an unpublished paper entitled—

"Investigation of Cut-over Land for Pulpwood Production" (1921) of which Mr. Austin Cary wrote that he considered it the most practical scheme yet devised.

The plan may be explained diagrammatically on a square mile "Section" as follows—

Starting at a known point (say, the N. E. corner of the section) a line is run by compass and pacing 20 chains (¼ mile) due south to the beginning of the first "strip." This strip (compass and pacing) is run due west for 80 chains (one mile). At the end of the first 10 chains (⅛ mile) a quarter acre circular plot is laid off by tape (59 foot radius) and on this plot all the trees are measured, as indicated below, and entered on the "Tally Sheet for Growth Study by Quarter Acre Plots" as per sample herewith.



Two (2) acres measured in 640—1 in 320 = .0031 or .3%

Data to be secured: On each ¼ acre plot—

Caliper and tally all Softwoods down to incl. 5 ins. (4.6" and up.)

Caliper and tally all Hardwoods down to incl. 10 ins. (9.6" and up.)

Suggested classes—5 to 9 ins. incl. (trees normally to be left
softwoods 10 to 14 ins. (spruce)
15 and over

Ascertain by basal area, the mean sample tree in each diam. group and select a tree of corresponding diameter. For mean sample trees take following measurements.
- D. B. H.
- Height (approximate)
- Bark thickness
- Increment in terms of years required to grow last inch in radius from boring.

Plots to be numbered—located on map, classified by forest type (swamp, flat, hardwoods and spruce slope)—and condition (virgin, cut over—when—burns, etc.)

Data on **reproduction**: Is it adequate to restock the area?

Where the study is primarily to cover the growth of spruce and balsam it will not be necessary or even desirable to make borings of any other species unless it be second growth white pine. The borings would be
- a—One of mean sample tree of spruce in the class falling between 5 and 9 inches, d.b.h.
- b—One of mean sample tree of spruce 10-14 ins.
- c—One of mean sample tree of spruce over 15 ins.
- d—One of mean sample tree of balsam 5-9 ins.
- e—One of mean sample tree of balsam 10-14 ins.

There would normally be, therefore, five borings on each plot for which the six inch Swedish increment borer is most suitable. It is believed that one crew of three men can cover 1½ square miles (960 acres) and can establish 12 such quarter acre plots in a working day or, at the rate of 20 working days, can cover an area of about 20,000 acres in a month of field work. This allows for time needed to make computations, for moving camp and for unforeseen contingencies.

The **office work** should be done as promptly as possible following the completion of the field data and involves the usual computations, plotting of curves and preparation of tables. (See Article by Recknagel in Oct., 1922 issue of "Journal of Forestry" on "Growth of Spruce and Balsam in the Adirondacks.")

Coming now to the subject of **Cutting Regulations**, this is a very technical matter involving the determination of a sustained yield. No mere diameter limit regulation will suffice for us now. Howard Morse of the Orono Pulp and Paper Co. said in a recent paper on "The Place of Forestry in the Paper Industry":

"It is the common idea that Diameter Limit cutting is the cure-all and that any company operating under the hard and fast rule of a 6-8-10-12 or 14 inch diameter limit to cut to in all places is really doing something. They are,—but—as no types of land can be proved to prosper under such a blanket rule, something less hard and fast must be provided to take each case under consideration by itself. We know, for in-

stance, that certain types of land if cut over by any such hard and fast ruling will soon after be a sorry sight, both from the eyes and the pocket viewpoint. The timber on such locations is not sufficiently well rooted to withstand the effects of the wind after the other trees have been removed. And as a consequence the result is a blowdown. This means that clean cutting is the only proper thing to do in such cases, if for no other reason than that the loss in the windfall timber is a dead one, as no salvaging under such conditions is possible.

"In other locations we find a hardwood mixed growth that includes a considerable number of softwood trees, many of which are already above the tops of the surrounding hardwood trees, healthy and vigorous. Below and well shaded out are many others that unless some care is taken of them will never grow and perhaps they may become so shaded out that they will die. The age classes represented here will be found to be lacking in any that will be able to utilize the light let in by any method of set diameter cutting and therefore here we are in a type that needs special attention in order that the stand may continue as a part softwood one. The general systems of cutting in use today rarely if ever leave such stands as anything but pure hardwoods with thousands of stunted softwood trees of all the smaller sizes gradually succumbing to the condition of lack of sunlight."

Cutting regulations find their best and most useful expression in a **Working Plan** which is prepared as a result of the data secured from the Inventory (how much and where lies the timber available for operation), and the Investigation regarding the rate of growth, together with a full knowledge of local conditions and company requirements. Such a Sample Working Plan was prepared by a member of the Sub-Committee last year at the suggestion of a joint meeting of foresters and timberland owners in New York in June, 1922. (Bul. 15, Empire State Forest Products Association.)

In this bulletin the cut was figured for spruce on a theoretical area of 6,000 acres of spruce flat type in the Adirondacks. The Calculated Yearly Cut for spruce for a ten year working period was figured by eight different methods known to foresters (instead of the four given in aforesaid Bul. 15 of the E. S. F. P. A.) and found to average 2,270 cords per year with a 20 year cutting cycle (period of return to same area) and an approximate diameter limit of 10 inches d.b.h. for spruce.

The cut for the 10 year working period equals 22,700 cords of spruce. There are standing 28,533 cords of spruce above the diameter limit, so that at least 5,833 cords of spruce will be left as growing stock.

The annual growth is figured as 2,068 cords of spruce or for ten years this is 20,680 cords of spruce which added to the growing stock of 5,833 will bring the forest capital at the end of ten years to 26,513 cords of spruce.

This shows that the management is conservative, and will not deplete the present growing stock of spruce (excepting the over-mature trees whose replacement is not desired.) Furthermore, the revision of the working plan at the end of the first ten year working period will in all probability permit of a substantial raise in the annual cut due to the increased growth under the more favorable forest conditions under management.

For the tract in question this, therefore, accomplishes the object sought in all cutting regulations—continuous production, or, as foresters term it, a **sustained periodic yield."**

A. B. Recknagel, Cornell University, Chairman.
R. S. Kellogg, News Print Service Bureau
F. A. Gaylord, Nehasane Park Association
H. L. Churchill, Finch, Pruyn & Co., Inc.
J. E. Rothery, International Paper Co.

C—Report of the Lake States Sub-Committee
"Work of a Forestry Department"

1—General Policy
Decision of Directors of Company as to Continuous Forest Production.

2—Oranization
a—Responsible head of department, preferably an officer of the company.
b—Manager, should be business man; might well be a forester, to advise on technical questions, and to be responsible for all forest engineering work; reports to, and discusses policies with, responsible head.
c—Assistant, also a forester, but a younger man to do much of the field work.
d—Head scaler, in charge of all scaling.
e—Head Clerk, under the Accounting Department, in charge of all camp clerks, timekeepers, storehouse men, etc.

3—Activities
A—Office
Development of plans, based on extensive field work, covering:
1—Forest protection
a—Fire
b—Insects
c—Fungi
d—Trespass
2—Operations
a—Logging
b—Forest Regulation
3—Research
4—Reports to Management

B—Field
1—Inventory, including cruising and mapping, and establishment and maintenance of boundary and interior lines.
2—Operations
a—Logging
b—Transportation
c—Scaling
d—Brush disposal
e—Protection
f—Reforestation
g—Construction; roads, trails, dams, camps, etc.
3—Inspection
a—Logging
b—Scaling
4—Studies
a—Utilization
b—Growth, volumes and yields
c—Thinnings
d—Nursery and reforestation
e—New methods and machinery
f—Efficiencies.

G. B. Wells,
John Schroeder Lumber Co.
E. S. Holloway,
Hammermill Paper Co.

Conclusions

It is the opinion of the Committee that the practice of forestry on the timber lands of a paper company, after a policy of continuous production has been accepted, all boils down to a basis of "Will it pay?"; not only now, but also 5, 10, 25 or 50 years hence.

No extensive timberland holding can be properly and efficiently managed for sustained production without the technical advice of a trained forester.

The Committee suggests that the management of paper companies ask themselves the following questions, the answers to which will determine their manufacturing, sales and forest policies:

If it costs from $15 to $20 an acre to reforest an acre of land to 1,200 trees, with a resultant yield of from 20 to 30 cords in 50 years and a probable final stumpage cost of from $10 to $15 a cord, what stand do you take on the following—

I—Do your present timberland holdings insure an adequate supply of pulpwood for continuous operation at your present rate of production during the next 50 years?

II—If not, do you see where such a supply can probably be obtained?

III—Have you enough land to insure a continuous supply of pulpwood, sufficient to meet your needs, if a policy of forest management, protection and reforestation, is now adopted?

Respectfully submitted,
FORESTRY COMMITTEE
WOODLANDS SECTION
AMERICAN PAPER & PULP ASSOCIATION
April, 1923 O. M. Porter, Secretary.

Addresses

B. S. Summers, of the Port Huron Sulphite and Paper Company, Port Huron, Mich., spoke on "Weighing Wood in Pulp Manufacture," and pointed out that weighing wood has three major advantages, as follows:

First, a good indication of the quality of the wood purchased; second, location of the chief loss in manufacture, as between departments, and, third, the stimulation of research and efficiency of management to save losses.

Mr. Summers reviewed a series of experiments conducted by his company, with the results obtained, and showed that the weighing of wood would make a large saving of material possible, through locating losses otherwise indefinite as between departments.

In referring to measurements, he said that it was found

that a cord of rough wood varied from 3,065 to 5,570 pounds, the former being wood three or four years old, containing 18 to 20 per cent moisture, and showing signs of decay, while the latter figure was for watersoaked wood running from 40 to 50 per cent water, and sound. These figures refer to spruce, with a sprinkling of balsam.

"It will probably be sufficient for the present," he said, to state that sound Canadian spruce, heavily watered, will frequently run over 5,000 pounds to the cord."

He pointed out that the tests soon showed that the number of logs making up a cord was an important factor in the barking loss. The tests effected a saving by pointing out how machinery could be adjusted to reduce the barking loss. Other losses were similarly averted by the information developed from the weighing of the wood.

That the spruce bud worm is doing more damage to the pulp wood forests of North America than all the cutting by the paper companies, was pointed out by C. W. Boyce, of the United States Forest Service. Quoting Chief Forester Piché of the Province of Quebec as authority for the estimate of the loss of 75,000,000 cords of pulp wood in the last ten years, he said this comes within 50 percent of the entire amount of wood used by the paper industry of North America since its beginning. It was also pointed out that the heaviest portion of this damage was in the three years ending in 1920. At a minimum estimate of $15 per cord, the financial loss due to this insect would total over a billion dollars. The losses in other portions of the northeastern states and provinces add hundreds of millions of dollars of losses to this huge figure.

Ellwood Wilson of the Laurentide Paper Company of Quebec talked on the use of airplanes in the pulp industry, using stereopticon views. He said the manufacturers were sending ex-army aviators over dense lumber tracts to make thousands of photographs of known regions. Study of the photographs afforded certain rough rules affecting density.

The aviators then would photograph unknown tracts and an approximate calculation of the density of unknown forest regions become possible by using the rules. A two-hour trip in an airplane would develop data that "cruisers" sent out to survey lumber regions would need more than two weeks to collect.

Mr. Wilson said that in Canada the airplane fire-fighting system has developed to the point where portable pumps and crews of fire fighters were located at central points and could be hustled into flying craft and conveyed long distances to fight blazes that imperiled great tracts. This system, he said, had saved Canada many millions of dollars.

Fishermen and canoeists were more to blame for forest fires than any other two factors, explained the speaker. The forests of Quebec were closed to them last Summer because of the menace of fires from their carelessness.

O. M. Porter, secretary of the Woodlands Section, reported that more wood forest was destroyed by fire in Canada in 1922 than would be required by the pulp manufacturers of the United States in a year and a half.

"Last year Canada had 4,000 fires, according to statements just made to Provincial Parliaments," he said, "and forest equivalent to a strip a mile wide from Halifax to Winnipeg was destroyed."

The woodlands section, consisting of foresters and woodland officers of American Paper Companies, discussed reforestation work by various paper mills and the active forestry campaign begun by the paper industry.

The Forestry Committee reported that sustained production from an extensive timberland holding was impossible without the technical advice of a trained forester. It was suggested that intensive methods and the utilization of new species were necessary now on the part of American paper manufacturers "to avoid drastic action later as regards their supplies of available pulpwood."

"We import about one-sixth of our annual consumption of pulpwood," the report continued, "and probably not less than one-fifth of the wood pulp used in this country. Foreign importations have increased very rapidly within the last few years, but both Canadian and European consumption of wood pulp, for their own domestic manufacture of paper, will inevitably increase. This will reduce the exports to the United States, and will mean that we will of necessity have to produce our own wood pulp."

Paper Jobbers' Meeting

AT THE twentieth annual meeting of the National Paper Trade Association of the United States, held at the Waldorf-Astoria Hotel, New York, on April 9, 10 and 11, Frank W. Power, of Boston, Mass., was elected president for the ensuing year, succeeding Charles N. Bicknell, of Cleveland, O., who served as president for two years.

Fritz Lindenmeyr, of New York City, was re-elected vice president in charge of the Fine Paper Division of the association, and James A. Carpenter, of Kansas City, Mo., was chosen vice president in charge of the Wrapping Paper Division, succeeding Mr. Power. A. J. Corning, of Baltimore, lived up to his title of perennial treasurer by drawing a re-election to that office. William C. Ridgway was again chosen secretary, and Charters K. Higgins assistant secretary.

The meetings of the paper jobbers and distributors were well attended. The annual dinner, entertainment and dance of the association, given in the Grand Ball Room of the Waldorf on the evening of April 11 exceeded all records in point of attendance. An enjoyable vaudeville bill, including the renowned Will Rogers and other acts from the Follies and the Music Box in New York, was staged, following which dancing continued until the wee small hours of the morning.

Waste Merchants Association Dinner

About 260 members and guests, including a generous sprinkling of paper mill men who were in New York attending the convention of the American Paper and Pulp Association, were present at the fifteenth annual dinner of the Waste Merchants Association of New York in the East Ball Room of the Hotel Commodore, New York, on the evening of April 11. As is the custom at this yearly gathering of paper mill supplies dealers in New York, there was no speechmaking or other formality, the evening being given up to the enjoyment of a sumptuous dinner and an entertaining vaudeville program. A stage was erected in the center of the dining hall, and the tables grouped in such a manner to afford everyone an unobstructed view of the vaudeville artists on this stage. Two orchestras provided music, and a highly entertaining vaudeville show kept the diners amused for several hours.

Raw Stock or Paper for Coating*

BY NORMAN CLARK

THIS report is presented as a contribution from the Committee on Coated and Processed Papers. It is not to be considered as final, but is more in the nature of a start toward the standardization of one of the important raw materials of the coated paper industry. It is hoped to add to this report from time to time, and to make such changes as are justified by improved methods of testing and a more complete knowledge of the requirements of paper for coating.

It is quite certain that there will be many differences of opinion on this subject and since it has proved impossible to collect and tabulate them all, it may be well to state that those given have been taken from the experiences of the writer while associated with three of the coating mills in the East, and that they have been supplemented by a few notes and observations from the other members of the Committee.

Before taking up the subject of the properties of the individual papers, it would be well to go into the matter of the general characteristics which all coating sheets, colored or white, should possess.

First—Formation. It can be said almost as a truism that all sheets intended for coating purposes should be as uniformly closed as possible under the conditions of the prescribed furnish. A sheet tending to be wild does not coat well because there is not an even absorption of the coating over the sheet. Again, a wild sheet presents a disagreeably mottled appearance if finished at all high, whether on the stack or friction. This wild and bunchy paper is especially undesirable for high grade book paper, as the mottled appearance not only shows in the finished sheet but is very noticeable in printing half tones or solid blacks because of the uneven absorption of the printing ink.

Second—Dirt. Under this head comes dirt specks, shives and rosin and lime spots. Whatever the character of the spot, it should not be present because it is not true that a coating covers up everything. It does cover a multitude of sins, but not all, and spots showing through the coating or causing a local thickening or thinning of the coat make an inferior job. It is frequetly found that the heavy calendering given the coated product makes the dirt and shives more noticeable than they were in the uncoated paper. This matter of cleanliness is imperative in a fine white sheet intended for Dial, Litho, Enamel, Proving Plate or Translucent, while the question of shive is of particular importance in a high percentage ground wood sheet. The known affinity of ground wood for dyestuffs produces, if shive be present in any quantity, a sheet mottled with the more darkly colored particles of shive.

Third—Color. As a general rule the color of the sheet should be as good as possible, for the better the color of the

*Paper read before the annual meeting of the Technical Association of the Pulp and Paper Industry held in New York, April 11, 1923.

raw stock, the better that of the finished coating. The nearer the color of the raw stock comes to that desired in the finished paper the better, for under such conditions streaky coating, brush marks and poor spreading of the coating are not nearly so noticeable as they are if there is a great color difference between the paper and the coating applied.

Many coating manufacturers have a preference for a certain tint of white, and this desire must be taken into account by the makers of the paper. Whatever the tint desired it is imperative that shipments should be uniform throughout. Unfortunately this is often not the case and it is common for a shipment to have to be divided into two parts before coating. The writer has even seen a single lot of paper which had to be separated into three parts because of differences in color.

Fourth—Slack Edges. In running a coated sheet from the coating machine to the cutter, it is necessary that the tension be uniform. This is a very difficult task where there are slack edges and is, besides, productive of much waste due to breaks and cuts.

Fifth—Thickness. In order to get a uniform coat the sheet must be of uniform thickness. This is of course more apt to vary on a heavier than on a lighter weight. If one edge of the sheet is thinner than the other then it will take on more color and so present a difference, side to side, of the coated sheet.

Sixth—Fuzz. Fuzz on a sheet is very objectionable, not only to the coating man but to the user of coated paper, the printer. To the coating man fuzz gives trouble in local coloring of brushed-up fibers, or difficulty in getting finish desired. To the printer or lithographer it is a constant source of trouble, adhering to his plates and causing a smearing of the ink.

Seventh—Finish. The coating man requires a certain amount of finish, depending on the purpose for which the sheet is intended, but in general, the highly finished sheet is not desired. Just enough to even off the surface of the sheet is all that is required except for special lines. Of extreme importance is that the finish be uniform across the sheet to insure uniform brushing on of the color.

Eighth—Curling. Very often rolls are received which will curl badly on one edge when drying on the lines. This causes waste and delay on the reels.

Ninth—Feel. The "feel" of a sheet of paper is something which our technical language is inadequate to express except in very general terms. Probably the best that can be done along this line is to say that it should be velvety or leathery in feel, and that it should not be dry, harsh or brittle when crumpled. It should bulk well, and these properties can be attained by getting the formation close and not forgetting the soda pulp.

Closely associated with the feel of the paper is its tear. This can now be measured and recorded by a number of instruments, but sufficient data are not available to permit of standardizing this factor. Great difference of opinion exists as to the properties desired in the tear; some prefer it short

Grade	Rm. Weight	Furnish Per Cent	Bursting Strength	Sizing	Uses
Friction & Flints	20x24-17	30 Sul. 50 to — 70 Gw. 50 30 Soda 70 Sul.	10 to 15	Medium	Box covering
Plate	20x24-17/50 and specials	30 Soda 70 Sul.	12 to 35	Soft	Labels, box covering, signs, kindergarten supplies
Book	25x38-40/80	40 Soda 60 Sul.	10 to 20	Soft	Printed work
Dial*	22x28-70/160	20 Soda 80 Sul.	50 to 80	Hard	Clock & watch faces
Playing Card	22x28-45/115	30 Soda 70 Sul.	20 to 50	Hard	
Litho	25x38-35/90	20 Soda 70 Sul. 10 Esp. or Rag	15 to 40	Hard	Lithographic work
Boxboard	.011 to .032	Manila Liners with softer middle. Manila should be fairly long to give folding properties	40 to 70	Medium	Boxes
Enamel*	25x38-35/125	30 Soda 70 Sul.	15 to 60	Medium	Box covering, illustrations
Translucent**	25x38-110/150	15 Rag 15 Soda 70 Sul.	50 to 70	Medium	Embossed work, lithography
Proving plate*	22x28-50/80	40 Rag 15 Soda 45 Sul.	15 to 30	Medium	Lithography
Tablet	22x28-50/80	30 Soda 70 Sul.	15 to 25	Medium	Pads
	22x28-50/120	Manila (Long for folding)	30 to 70	Medium	
Label	20x24-17/50	50 Gw. 50 Sul.	10 to 20	Hard	Printed labels
		60 Sul. 40 Soda			
Enamel, Blotting	22x28-90/180	100 Rag		Hard 1/S	
Metals	20x24-12/50	Glassine Manila Greaseproof Kraft Ground Wood or Free Sheet		Medium	
Micas	20x24-20/28	High Soda to give bulky sheet		Soft	Fancy box coverings
Waterproof	20x24-20/35	100 Sul. 45 Sul. 55 Gw. 25 Rag 15 Soda 35 Sul. 25 Gw.	10 to 30	Medium	W. P. Box coverings

*Grades thus marked very particular as to color.
**Capable of standing embossing.

and clean, while others want a long fibered tear with considerable "hang-on" and a tendency for the paper to split.

Appended is a table showing under each grade of coating the weight, furnish, bursting strength and relative sizing of the papers required for each purpose. A final column showing the uses of the finished papers has also been added. There will probably be exceptions taken and a certain amount of lack of agreement here depending on the usage in various mills.

The sizing was determined by the cell method, using 100 ohms. resistance. The following values were taken:

Soft—Up to one minute. Medium—One minute to three minutes. Hard—Above three minutes.

Coloring Matters for Coated Paper

BY NORMAN CLARK

The coloring of coated paper may be divided into three sections, each dealing with a different form of coloring matter; namely, dyes, color lakes or pulps, and pigments. Besides these there is a special section dealing with metal papers. These various forms of coloring matter are often mixed to give some desired effect but in general dyes are used in producing tints, pulps for deep colors, and pigments for plates or lithos where a flat tone is wanted.

Dyes

Dyes may be placed in four classes for this consideration: 1—Basic; 2—Acid; 3—Direct, cotton and wool; 4—Those dyes which require a special solvent or other agent to bring out their strength thus rendering them unsuitable for coating work.

1—Basic Dyes. The coating mix is usually alkaline in reaction to the casein solution, wax emulsions and satin white, if any be used. Besides this there is very often alkali in the form of ammonia added, as such, or in connection with an oil, to better the working conditions of the mix. This condition decolorizes or discolorizes the basic dyes with the possible exceptions of Rhodamine and Safranine. This is particularly noticeable in concentrations of more than 2%. Then there is the presence of casein which tends to precipitate the basic dyes. Beyond this there is the tendency to change in hue when exposed to heat in a moist condition, as occurs when the coated sheet is pasing down the drying lines. With the exception of Rhodamine, Auramine and Methylene Blue B. the dyes are very fugitive when exposed to light. However, the basic dye may be used with glue or an acid starch for size if too much is not expected of the finished sheet. It must be remembered that the great attraction and temptation to use basic colors lies in the fact that they exceed in brilliance any other class of dyes.

The following lists of dyes are merely those which the writer is familiar with from his own work, and many others might be added, particularly in the acid group.

The basic dyes available for use are as follows:

Rhodamine	Methyl Violet
Safranine	Bismark Brown
Fuchsine	Methylene Grey
Auramine	Chrysoidine
Malachite Green	Rubine
Victoria Green	China Green
Brilliant Green	Diamond Green
Metheylene Blue	Night Blue
Victoria Blue	Nile Blue
Paper Blue	Ethyl Purple

2—Acid Dyes. These dyes form the most available class from which to select colors for coating work. They are not affected by casein and are not, in general, affected by the amount of alkali present in the mix. They are fast to drying conditions on the line and are much more permanent to light in the finished sheet than are basic dyes.

The acid colors the writer is acquainted with are as follows:

Crocein Scarlet MOO	Alizarin Green C
Brilliant Crocein C	Brilliant Acid Blue
Crocein Orange	Acid Blue No. 196
Fast Acid Red GX	Xylene Blue
Brilliant Red J	Patent Blue
Ponceau R	Fast Blue A S
Acid Ponceau	Acid Violet 4B NS
Fast Crimson GX and BN	Violamine
Orange, R, A, F and II	Resorcin Brown
Chinoline Yellow	Acid Blue Black N
Brilliant Yellow G	Nigrosine J, B, 819
Xylene Yellow	Cloth Red
Fast Lt. Yellow 2 G	Eosine
Resorcin Yellow	Rose Bengal
Tartrazin	Napthol Yellow
Metanil Yellow	Napthol Green
Fast Acid Green B	Alizarin Sapphire
Acid Green L Ex.	Alphazurine
Xylene Fast Green B	

3—Direct, Cotton & Wool Dyes. Of these, the so-called wool colors are really the only available ones. This is due to the fact that the direct and cotton colors flatten and dull when mixed with clay so they are of little use. The demand of the colored coated paper trade is largely for bright colors. This does not refer to a mill making colored tag or label stock where these colors may very likely be used. The wool colors available are as follows: (These may be classed by some as Acid Dyes.)

Wool Scarlets (various markings)
Wool Blue B and 3B
Wool Green S

The most useful direct colors are:

Pheno colors
Benzo Purpurin

4—Special. The reason dyes other than those classes before mentioned cannot be used is that they require a special solvent, mordant or developer, and the presence of such material would injure the coating mix.

Color Lakes or Pulp Colors

Pulp colors are usually acid or basic dyes thrown down on a base by a precipitating agent. A common base is a mixture of clay, barytes, soda ash and alum and the acid dyes precipitated with barium chloride. The basic colors are often used to top off the acid colors to add brilliancy to the lake, but on account of their fugitiveness are not often used alone. The number of color lakes is large but there is more uniformity in their nomenclature than in the case of dyes. The difference in the working qualities of the pulps from various manufacturers arises from a difference in manipulation of the pulp during formation rather than in the original materials used.

The Pulp Colors may be listed as follows:

REDS—Turkey Red; Persian Red; Arabian Red; Granite Lake; Red Lake; Maroon.

ORANGE—Orange Lake; Victoria Orange.

YELLOW—Lemon Yellow; Medium Yellow; Other varieties of chrome yellows.

GREEN—Emerald Green; Brilliant Green; Nile Green; Silk Green.

BLUE—Marine Blue; Blue Lake; Steel Blue.

VIOLET—Violet Lake.

BROWN—Raw Sienna, Really Pigments; Burnt Sienna, Really Pigments; Raw Umber, Really Pigments; Burnt Umber, Really Pigments.

BLACK—Black Lake, Really Pigments; Friction, Really Pigments; Lake, Really Pigments.

BRONZE—Bronze Lake.

Pigments

These are insoluble solids which can produce the sensation of color in other substances by being intimately mixed with them in the form of a powder or powder suspension in water. Papers colored with pigments are not capable of taking as high a glazed finish as those colored with pulp colors, consequently pigments are used either in conjunction with pulps or alone for the production of flat tones. They have one redeeming feature, however, and that is their fastness to bleeding and light.

The common pigments are as follows:

RED—Oxide of Iron—Venetian Red, Indian Red, Light Red and Burnt Sienna; **Oxide of Lead**—Red Lead and Orange Lead; **Sulphite of Mercury**—Vermillion.

ORANGE AND YELLOW—Chromates of lead, barium, zinc and strontium and chrome colors; **Natural Earths**—Siennas and Ochres; **Cadmium Sulphite**—Cadmium Yellow.

GREEN—Aceto arsenite of copper—Emerald Green; **Native Carbonate of Copper**—Malachite; **Zincate of Cobalt**—Cobalt Green.

BLUE—Complex Silicate of Soda and Alumnia—Ultramarine; **Semi-organic compounds of iron**—Prussian Blue, Chinese Blue; **A compound of cobalt oxide and alumnia**—Cobalt Blue.

BROWN—Inorganic earth colors—Umbers; **Semi-organic earth colors**—Vandyke Brown.

BLACK—Pure Carbon Blacks—Lamp Black, Vegetable Black and Carbon Black; **Contain other materials**—Animal Black, Bone Black, Ivory Black and Drop Black.

Metal Papers

Metal papers depend for their brilliancy on a coating of metal either put on the sheet as a coating or dusted on a

varnish coat as the clear metal powder. The metal powders consist of:

Bronzes—a. Various combinations and treatments to give varying shades; b. Colored bronzes—colored by heat treatment and by dyes.

Silvers—a. Tin; b. Zinc; c. Aluminum.

Methods of Handling Coloring Matters

Dissolving Dyes. A satisfactory method for dissolving dyes is to make them into a paste with cold water and then add as much boiling water to the paste as the quantity of dye calls for, stirring continually during dilution. In the case of basic dyes a little acetic acid may be added to the paste. It is well not to exceed a concentration of half a pound of the dye per gallon of solution.

Exceptions to this procedure are occasionally met with as in the case of auramine and methyl violet. With the former the water for dilution should not be over 160° F, as the dye breaks up above that temperature. Methyl violet should be treated directly with hot water, as cold water tends to form a hard mass which is extremely difficult to dissolve.

Adding to Coating Mixture. It is always best to add the dye solution to the mix in as dilute a form as possible. This will depend upon the end consistency of mix desired. It is not advisable, except in special cases, to exceed a concentration of 4% dye based on the amount of white pigment present in the mix. The dye should always be added before the size and waxes. It may be added with a large amount of water direct to the dry white pigments or with a correspondingly smaller amount of water to the water paste of the white pigments.

Difficulties in the Use of Pulp Colors. As pulp colors are simply suspensions in water of insoluble coloring matters, the percentage of water present in a pulp is of peculiar importance. In the writer's experience this water varies from 35% to 88% in different pulps and may vary 15% in the same shipment of the same pulp. This factor makes a big difference in the cost of coloring, and manufacturers of colors should specify at what solid content the lakes or paste colors are billed.

But it is in their use that this factor of moisture content causes the most trouble. Take for example a lake color whose solid content is standard at 40%; 100 lbs. in this case yields 40 lbs. dry color. If it runs 48% dry the same quantity of paste yields 48 lbs. of dry color and if on the other hand an excessive amount of water is added to the barrel to overcome evaporation (as is practiced by many manufacturers of coated papers) the dry weight may go as low as 33 lbs. per 100 lbs. of paste. These figures, 40 lbs., 48 lbs., and 33 lbs., are by no means out of reason and it is seen that, under such conditions, it is practically impossible for a color man to produce a duplicate color mixture without an excessive amount of care.

It is possible to bring each pulp, in reasonable quantities, to a pre-determined standard of moisture, and hold it there for a considerable time. For this refinement proper containers and strict testing are necessary but the greater certainty of results probably warrants the expense.

Evaporation of Spent Liquor in the Soda and Sulphate Pulp Processes*

By G. K. SPENCE

New York and Pennsylvania Co., Johnsonburg, Pa.

UNTIL recent years a large majority of soda and sulphate pulp mills in this country has used Yaryan evaporators to concentrate spent liquor from the wash pans or diffusers. Yaryans have answered their purpose well, and when given the proper attention are as economical as regards steam consumption as any other evaporator on the market. For mills of small production in which one or two Yaryans have sufficient capacity to handle all of the liquor required and concentrate it to 36° to 38° Bé. at 60° F., there is no reason whatever for making a change. In this case the man in charge of the room has plenty of time to give the machines and pumps proper attention and obtain very efficient results.

The tendency in recent years has been to increase the pulp production to such an extent that four and even five Yaryans are not sufficient to handle all of the spent liquor. Five Yaryans means at least fifteen and generally twenty pumps to take care of, in addition to all minor details, such as the examination for leaks around the different effects, etc. The result has been that the Yaryans and pumps have not received the proper attention, and therefore the efficiency of the machines has fallen down. It has been this condition that has caused pulp manufacturers to look around for evaporators with larger units.

It is not the object of this paper to try to influence any pulp manufacturer to purchase any particular type of evaporator, but simply to give the members the benefit of the writer's experience with evaporators, whose actual operating experience has been confined to Yaryans, with which all of the New York & Pennsylvania Co.'s soda pulp mills are equipped at the present time. Owing to conditions stated above, installations of evaporators with larger units in some of the mills have been considered, and as a result other types of evaporators have been studied to some extent.

At the present time, ten different makes of multiple effect vacuum evaporators are offered to the pulp manufacturer for his use. They are: The Yaryan, Scott, Zaremba, Swenson, Newhall, Kestner, Lillie, Badger, Buffalo Foundry & Machine Company and Manistee Iron Works evaporators. It is not necessary to give a detailed description of these different evaporators, as any person interested can obtain this information by writing to the manufacturers for catalogues and blue prints.

Yaryan Evaporation

The Yaryan evaporators are of the rapid circulation horizontal tubular type, the tubes being in coils of three or five each. The last tube of each coil discharges into the separating chamber, where the liquor strikes a baffle and drops, while the steam from the liquor carries over into the shell of the next effect. The liquor from the first effect passes to the tubes of the second effect, the heating of which is accomplished by the steam from the liquor of the first effect. This same operation takes place from the second to the third effect of a triple, and from the third to the fourth effect of a quadruple effect evaporator. The steam in passing from one effect to the other first passes through a catch-all designed to catch any entrained liquor and convey it to the liquor line entering the next effect. Yaryans are in use in a large number of soda and sulphate pulp mills at the present time.

Scott Evaporators

The Scott evaporator is of the vertical tube circulation type. In place of having one central down-take, the down-takes are distributed over the whole area of the heating surface, so that each nest of tubes is taken care of by its own circulating tube. This gives a very rapid circulation and prevents, to a large extent, incrusting of solids in the tubes. In this machine, as in the Yaryan, the liquor passes through the tubes and the steam on the outside. The vapor chamber over the heating surface is of sufficient size to minimize entrainment of liquor in the vapors when passing from one effect to the other. As in the case of Yaryans, the Scott evaporators are equipped with catch-alls to take care of any entrained liquor. They can be furnished in any size, and at present are in use in soda and sulphate mills in this and foreign countries.

Zaremba Evaporators

The Zaremba evaporator is of the horizontal tubular type; but unlike the Yaryan and Scott, the steam passes through the tubes and the liquor is on the outside. They are built in multiple effect and of any size desired. The vapor chamber over the heating surface is of sufficient size to minimize entrainment of liquor in the vapors passing from one effect to another.

This evaporator is equipped with an internal Hughes centrifugal separator, which is fitted at the top of the vapor chamber. The escaping vapors pass through the long spiral passageway of the centrifugal separator, which throws the entrained liquor or foam to the outer edge of the spiral passageway. This is a special perforated plate having a number of small fins, which catch and retain the liquor particles, and in the case of foam reduces it to a liquor by breaking up the foam bubbles. The liquid trickles down the perforated wall of the separator and flows through a sealed drain under its center and is returned to the evaporator. This is considered a very efficient form of separator. Zaremba evaporators are installed in a number of pulp mills in this country and giving very good results.

Swenson Evaporators

Swenson evaporators, like the Zaremba evaporators, are of the horizontal tubular type, with the steam passing through the tubes and the liquor on the outside. There is a vapor chamber over the heating surface to minimize the entrainment of liquor in the vapors and catch-alls on the outside after each effect to take care of any entrained liquor. Swenson evaporators are built in any size desired, and are at present in use in a number of pulp mills. I understand that the Swenson Company has arranged to take care of the present Yaryan installations and use their engineering ability to

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improve future Yaryan installations. Their chief engineer states that they will be in a position to manufacture Yaryans of as large units as desired, and at the same time maintain the same efficiency.

Other Types of Evaporators

The Newhall evaporator, like the Zaremba and Swenson, is of the submerged tube type.

The Kestner evaporators are of the vertical tube type; but while the general run of the vertical tube evaporators have tubes from 7 feet to 12 feet in length, the Kestner evaporator has 23 feet tubes. Like other vertical tube evaporators, there is a vapor chamber over the heating surface. It is of the rapid circulation type, the liquor passing through the tubes and the steam in the chamber on the outside of the tubes. There are catch-alls through which the vapor passes in going from one effect to another to take care of any entrained liquor. There are Kestner evaporators working on sulphite waste liquor in this and foreign countries; but there are not many installations in this country working on spent liquor from soda and sulphate pulp mills.

The Lillie evaporator, like the Yaryan and Kestner, is of the rapid circulation film type.

The Badger Company has recently developed a vertical tube rapid circulation type of evaporator, with tubes about the same length as the Kestner tubes. This is a new equipment and has not been in use long enough to gather sufficient data to make any definite statements regarding its operation efficiency, etc.

The Buffalo Foundry & Machine Company is manufacturing at present two types of evaporators for use in soda and sulphate pulp mills. One is a horizontal tube and the other a vertical tube type. They recommend the vertical tube rapid circulation type operated as triple or quadruple. The vapor and liquor boil up through vertical tubes from 10 feet to 12 feet long and deflect downward through an annular baffle ring. The liquor returns to the bottom of the steam chest, while the vapor passes through a large vapor space to the vapor outlet. Entrainment of liquor in the vapor is prevented by the change of direction and reduction of vapor velocity as soon as it leaves the baffle ring.

From an examination of cuts and blueprints of this evaporator it appears to be very simple to operate, and one which should produce efficient results.

The evaporator offered by the Manistee Iron Works is of the vertical tube type, in which the liquor circulates through the tubes and the steam on the outside. There is a shaft down through the center of the evaporator which operates a propeller at the bottom of the heating surface, which assists in circulation of the liquor. These evaporators are built in very large units, there being one operating at Ritman, Ohio, on salt liquor which has 22 feet diameter effects.

All of the above mentioned evaporators are made in double, triple or quadruple effects and require condensers, vacuum, feed and tail pumps.

Multiple Effect Evaporators

Multiple effect evaporators can be operated advantageously on exhaust steam from condensing engines, but in the present day of steam, turbines and motor drives, almost all evaporator installations are supplied with live steam. This steam pressure varies from 15 to 20 pounds, and the vacuum on the last effect from 24 inches to 27 inches.

All multiple effect evaporators have their talking points, and while some may be better than others for special purposes, when all is said, any good standard evaporator should with proper attention produce efficient results. However, they should be in units large enough so that two of them will take care of all of the liquor from the wash pans.

When operating a multiple effect evaporator the pulp manufacturer very often loses sight of the prime factor which is absolutely necessary to make his evaporator efficient. This prime factor is vacuum, and it is essential that every attention should be paid to keeping the vacuum as high as possible on the last effect in order to procure the proper working results. There has been a tendency, at times, to condemn evaporators without giving them the proper chance to show what they can really do.

I know of one case where the vacuum on the third effect of a triple was not over 20 in. and the machine was condemned because it was not producing efficient results. One can readily see how inefficient will be an evaporator working under a 20 in. vacuum in place of 27 in.

Causes for Inability to Maintain Vacuum

The principal causes for inability to maintain the requisite vacuum are leaks around the different effects, high temperature condenser water and inefficient vacuum pump. Leaks in the vacuum end of the machine can be readily detected by use of a torch. There is a tendency at times to use too much water in the jet condensers when the water is too warm for efficient results. This will flood the vacuum pump so much with water that its only office will be that of pumping water, and will not have the proper pull on the last effect of the machine. This condition can be remedied by using cataract condensers which consume a comparatively small quantity of condensing water, and will not flood the pump but allow it to pull a large amount of air in addition to the water and maintain the vacuum on the machine.

Multiple effect evaporators are built with the intention that they operate on a high vacuum principle, and when working under proper conditions a double should evaporate 1.8 pounds of water, a triple 2.7 pounds of water and a quadruple 3.6 pounds of water per pound of steam consumed. In other words, for the evaporation of each 1,000 gallons of liquor per hour a double effect evaporator will consume 4,630 pounds of steam, a triple 3,080 pounds of steam and a quadruple 2,310 pounds of steam.

The cooling water necessary for a triple effect, evaporating above amount of water per hour, would be 175 gallons per minute of 70° F. water and 235 gallons per minute of 80° F. water, while that necessary for a quadruple evaporator would be 130 gallons per minute of 70° F. water and 175 gallons per minute of 80° F. water.

There is no other way in which to better demonstrate the advantage of maintaining a high vacuum than by giving results obtained in the Yaryan rooms of four soda pulp mills when making an analysis of the different departments.

Results in Evaporator Rooms

In figuring the heating surface of a multiple effect evaporator, the heating surface of one body is always taken, whether it be a double, triple or quadruple machine, and where the surfaces differ in the different effects, the total in all effects is taken and divided by the number of effects to get the average heating surface for each effect. The following is the result of analyses of the evaporator rooms of the different mills:

Mill No. 1—2 triple effect yaryans	1-11 coil—5 tubes to the coil 1-12 coil—5 tubes to the coil
Average steam pressure on first effect	25 lb.
Temperature of weak liquor	160° F.
Altitude of the mill	125 ft.
Highest possible vacuum	29.86 in.
Boiling point of water	211.75° F.
Average vacuum	27 in.
Boiling point of water at this vacuum	112° F.
Average strength of weak liquor	10° Bé. at 60° F.
Average strength of strong liquor from the evap.	38° Bé. at 60° F.
Boiling point of strong liquor at yaryans	130.5° F.
Total 48% soda used at digesters in 24 hours	68,975 lb.
Loss at wash pans 1% or 690	1% or 690 lb.
Soda sent to yaryans	68,267 lb.
48% soda per gallon of 10° liquor	3.668 lb.
Weak liquor sent to the yaryans	102,200 gal.
48% soda per gallon of 38° liquor	3.67 lb.
Strong liquor from yaryans	18,602 gal.
Water evaporated in 24 hours	83,598 gal.
Water evaporated in 24 hours	696,871 lb.
Water evaporated per sq. ft. of heating surface	698 lb.
Water evaporated per hr. per sq. ft. heating surface	.349 gal.
Mill No. 2—1 quadruple effect yaryan 2 triple effect yaryans 1 triple effect yaryan	24 coils—3 tubes per coil 22 coils—5 tubes per coil 15 coils—5 tubes per coil
Average steam pressure	25 ft.
Temperature of liquor entering first effect	165° F.
Altitude of mill	575 ft.
Highest possible vacuum	29.22 in.
Boiling point of water	210.5° F.
Average vacuum	24½ in.
Boiling point of water at this vacuum	130° F.
Average strength of weak liquor	9° Bé. at 60° F.
Average strength of strong liquor	34° Bé. at 60° F.
Boiling point of strong liquor at this vacuum	156.68° F.
Total 48% soda used at digesters in 24 hours	153,174 lb.
Loss at wash pans	1½% or 2,298 lb.
Soda sent to yaryans	150,876 lb.
48% soda per gallon of 9° Bé. liquor	.6 lb.
Weak liquor sent to yaryans	251 461 gal.
48% soda per gallon of strong liquor	3.175 lb.
Strong liquor from yaryans	47,526 gal.
Water evaporated in 24 hours	203,934 gal.
Water evaporated in 24 hours	1,698,770 lb.
Water evaporated per sq. ft. of heating surface	484 lb.
Water evaporated per hr. per sq. ft. heating surface	.2.42 gal.
Mill No. 3—3 triple effect yaryans	11 coils—5 tubes per coil
Average steam pressure on first effect	25 lb.
Temperature of liquid entering first effect	165° F.
Altitude of mill	1,441 ft.
Highest possible vacuum	28.4 in.
Boiling point of water	209.2° F.
Average vacuum	23 in.
Boiling point of water at this vacuum	142° F.
Average strength of weak liquor	9¼° Bé. at 60° F.
Average strength of strong liquor	39° Bé. at 60° F.
Boiling point of strong liquor at this vacuum	159.9° F.
48% soda used at digesters in 24 hours	64,624 lb.
Loss at wash pans	1½% or 969.6 lb.
Soda sent to yaryans	63,654 lb.
48% soda per gallon of 9¼° Bé. liquor	.62 lb.
Weak liquor sent to yaryans	101,0?0 gal.
48% soda per gallon of strong liquor	3.?00 lb.
Strong liquor from yaryans	16,756 gal.
Water evaporated in 24 hours	84,283 gal.

Water evaporated in 24 hours	702,077 lb.
Water evaporated per sq. ft. heating surface	474 lb.
Water evaporated per hr. per sq. ft. heating surface	2.37 gal.
Mill No. 4—1 quadruple effect yaryan	24 coils—3 tubes per coil
2 triple effect yaryans	15 coils—5 tubes per coil
2 triple effect yaryans	22 coils—5 tubes per coil
Steam pressure on first effect	25-30 lb.
Altitude of mill	1,441 ft.
Temperature of liquid entering first effect	158° F.
Boiling point of water	209.2° F.
Highest possible vacuum	28.4 in.
Average vacuum	23 in.
Boiling point of water at this vacuum	142° F.
Average strength of weak liquor	9½° Bé. at 60° F.
Average strength of strong liquor	39½° Bé. at 60° F.
Boiling point of strong liquor at 23 in. vacuum	160.1° F.
48% soda used at digesters in 24 hours	165,824 lb.
Loss at wash pans	2% or 3.316 lb.
Soda sent to yaryans	162 508 lb.
48% soda per gallon of weak liquor	.62 lb.
Weak liquor sent to yaryans	257,950 gal.
48% soda per gallon of strong liquor	3.865 lb.
Strong liquor from yaryans	42,046 gal.
Water evaporated in 24 hours	215,904 gal.
Water evaporated in 24 hours	1,798,480 lb.
Water evap. in 24 hrs. per sq. ft. of heating surface	450 lb.
Water evap. per hr. per sq. ft. of heating surface	2.25 gal.

When the above analyses were made the Yaryan room of mill No. 1 was operating under ideal conditions. While the difference in efficiency of this department over the same department in the other three mills was not entirely due to increased vacuum, this increase will account for from 60 per cent to 75 per cent of the difference.

Steam at 25 lb. pressure will have a temperature of 266° F. The excess boiling point of liquor over water in each effect is assumed to be respectively 3° F., 8° F. and 18° F., or a total of 29° F. Therefore, the net temperature range at 23 in. vacuum is (266°—142°)—29° = 95°. If the vacuum is increased to 27 in. the net temperature range would be (266°—112°)—29°= 125°.

The water evaporated would be in direct proportion to the temperature ranges. Therefore, the capacity of the machine would be increased about 32 per cent by increasing the vacuum from 23 in. to 27 in., and maintaining the same steam pressure. If the machines evaporated 2.37 gal. per hr. per sq. ft. of heating surface at a 23 in. vacuum, they should evaporate 3.12 gal. per hr. per sq. ft. of heating at a 27 in. vacuum. Since mill No. 1 showed an increase of 1.12 gal. per hr. over No. 3 it can be seen that 0.75 gal., or 66 per cent of the diffeernce, was due to increased vacuum. The Yaryans of mill No. 1 were given proper attention, and as a result were in condition to evaporate the maximum amount of water in the allotted time.

It is of considerable assistance to evaporators to have the weak liquor pre-heated before entering the first effect, and this is done in a number of installations.

As a matter of control it is advisable to have a venturimeter installed to measure the weak liquor sent to the evaporator. This can be arranged so that the amount of liquor going to all or each individual evaporator can be measured when so desired, and this is a very good check on the working of the machine.

Some years ago the writer compiled a table which has been very helpful in determining the quantity of liquor handled by the Yaryans in the different mills, and it may prove of assistance to others desiring to check their machines:

Spent Liquor Table

11,000 gal.	of 1°	Bé. will make	7,800 gal.	of 1¼°	Bé. liquor at 60° F.
7,800	"	1¼°	Bé.	"	4,600	"	1¾°	Bé.	"	60° F.
4,600	"	1¾°	Bé.	"	3,000	"	2½°	Bé.	"	60° F.
3,000	"	2½°	Bé.	"	2,200	"	2¾°	Bé.	"	60° F.
2,200	"	2¾°	Bé.	"	1,800	"	3⅛°	Bé.	"	60° F.
1,800	"	3⅛°	Bé.	"	1,400	"	3¾°	Bé.	"	60° F.
1,400	"	3¾°	Bé.	"	1,200	"	4⅛°	Bé.	"	60° F.
1,200	"	4⅛°	Bé.	"	1,000	"	5⅛°	Bé.	"	60° F.
1,000	"	5⅛°	Bé.	"	800	"	6¼°	Bé.	"	60° F.
800	"	6¼°	Bé.	"	700	"	6⅞°	Bé.	"	60° F.
700	"	6⅞°	Bé.	"	600	"	7⅞°	Bé.	"	60° F.
600	"	7⅞°	Bé.	"	550	"	8½°	Bé.	"	60° F.
550	"	8½°	Bé.	"	500	"	9⅜°	Bé.	"	60° F.
500	"	9⅜°	Bé.	"	450	"	10⅛°	Bé.	"	60° F.
450	"	10⅛°	Bé.	"	400	"	11⅛°	Bé.	"	60° F.
400	"	11⅛°	Bé.	"	350	"	12⅜°	Bé.	"	60° F.
350	"	12⅜°	Bé.	"	325	"	13⅛°	Bé.	"	60° F.
325	"	13⅛°	Bé.	"	300	"	14⅛°	Bé.	"	60° F.
300	"	14⅛°	Bé.	"	275	"	15⅝°	Bé.	"	60° F.
275	"	15⅝°	Bé.	"	250	"	17°	Bé.	"	60° F.
250	"	17°	Bé.	"	225	"	18⅛°	Bé.	"	60° F.
225	"	18⅛°	Bé.	"	200	"	20⅛°	Bé.	"	60° F.
200	"	20⅛°	Bé.	"	175	"	22⅛°	Bé.	"	60° F.
175	"	22⅛°	Bé.	"	150	"	25°	Bé.	"	60° F.
150	"	25°	Bé.	"	125	"	28⅛°	Bé.	"	60° F.
125	"	28°	Bé.	"	118	"	30°	Bé.	"	60° F.
118	"	30°	Bé.	"	103	"	33°	Bé.	"	60° F.
103	"	33°	Bé.	"	100	"	33⅓°	Bé.	"	60° F.
100	"	33⅓°	Bé.	"	97.7	"	34°	Bé.	"	60° F.
97.7	"	34°	Bé.	"	94.2	"	35°	Bé.	"	60° F.
94.2	"	35°	Bé.	"	90.8	"	36°	Bé.	"	60° F.
90.8	"	36°	Bé.	"	87.6	"	37°	Bé.	"	60° F.
87.6	"	37°	Bé.	"	84.5	"	38°	Bé.	"	60° F.
84.5	"	38°	Bé.	"	81.6	"	39°	Bé.	"	60° F.
81.6	"	39°	Bé.	"	78.8	"	40°	Bé.	"	60° F.

100 gallons of 33⅓° liquor contains 310 pounds of 48 per cent soda or 256.6 pounds of 58 per cent soda. One gallon of 1° liquor contains 0.45 oz. of 48 per cent soda.

Loss of Soda at Wash Pans

Under a control system the loss of soda at the wash pans is known, and deducting this amount from total soda used in the digesters gives the pounds of soda sent to the evaporators. Knowing the average strength of this liquor, from the above table the pounds of soda per gallon can be found. Dividing this into the number of pounds of soda sent to the evaporators gives the gallons of weak liquor sent to the evaporators.

In the same way the gallons of strong liquor from the evaporators can be determined and the difference between gallons of weak liquor and gallons of strong liquor gives the gallons of water evaporated. Example—A mill used 150,000 pounds of 48 per cent soda in 24 hours and lost 1 per cent or 1,500 pounds at the wash pans. Therefore, 148,500 pounds of soda were sent to the evaporators.

Weak Liquor

The average test of the weak liquor was 9⅜ Bé. at 60° F. Referring to the table 500 gallons of 3⅜° liquor contains as much soda as 100 gallons of 33⅓° liquor or 310 pounds. Therefore, one gallon of 9⅜° Bé. liquor contains .62 pounds of 48 per cent soda.

The average test of the weak liquor was 9⅜° Bé. at 60° F. Referring to the table 90.8 gallons of 36° liquor contains as much soda as 100 gallons of 33⅓° Bé. liquor or 310 pounds. Therefore, one gallon of 36° liquor contains 3.414 pounds of 48 per cent soda.

Since 148,500 pounds of 48 per cent soda were sent to the evaporators and it contained .62 pounds per gallon, 239,516 gallons of liquor were sent to the evaporators. As a general rule, there is practically no loss of soda at the evaporators. Therefore, 148,500 pounds of soda were sent from them to the rotary tank, and since this liquor contains 3.414 pounds of soda per gallon, 43,497 gallons of strong liquor were sent to the rotaries. Since the evaporators received 239,516 gallons of liquor and delivered 43,497 gallons, they will have evaporated 196,019 gallons of water.

The Manufacture of Lake Colors*

BY H. H. HOLDEN

THE term "lake colors" is applied to pigments made from dyes and coloring matters by precipitating the coloring matter as an insoluble compound which can be used for pigmental purposes to distinguish them from natural pigments, such as ochres, umber, etc., and from chemical colors manufactured by direct combination and decomposition of distinct salts, e.g., such colors as lead chromates, chinese blue, emerald green, etc.

Until the introduction of coal tar colors, lakes were made from the natural dyes such as logwood, cochineal, etc. These were superseded by lakes made from artificial colors because the latter can be produced more easily and cheaply and possess greater staining power and brilliancy of shade and can be more readily standardized.

In the manufacture of lakes from artificial colors it is very important to understand the chemistry, constitution and properties of the various dyes. Every color has some chemical which will precipitate it to the best advantage and a knowledge of the way these chemicals react is very important.

The difficult and intricate chemistry of the manufacture of dyes does not necessarily concern the maker of lake colors, but the chemical nature of the colors he is using does, e.g., the reason why he cannot precipitate basic colors with barium chloride, when acid colors are readily thrown down by the same compound, requires his careful attention. In other words it is not the nucleus of the molecule of any given color which is of importance to the lake manufacturer, but rather the substitution and decomposition products which can be formed by the use of different chemicals.

Advisable to Work from Primary Shade

The policy of trade customs has had its effect in reducing the number of shades of colored coated papers demanded by the trade; this in turn has reduced the number of lake colors which it is necessary to make and keep on hand. The following colors are now manufactured: Red, Orange, Yellow (Lemon and Chrome shades), Green, Blue and Black. By the use of any of these primary colors it is possible to obtain almost any shade imaginable. It is found to be much more satisfactory to make the primary shade and then strike a color than to try and make a lake which will give the exact shade on the paper with one color.

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A red lake of good quality may be made on a blanc fixe base using Scarlet 2 RR as a dye. This is one of the cheapest acid colors of domestic manufacture and has been on the market about five years. The following procedure will be found satisfactory in making lakes from the acid colors. A 10% solution of alum is run into a large tank, having a conical bottom and agitated by air, and heated to 80° C. Another 10% solution of soda ash is then run in, forming sodium sulphate and aluminum hydroxide. The dye is then added in about a 10% solution and finally the barium chloride is run in in a concentrated solution. This forms an insoluble barium salt of the dye as well as barium sulphate and sodium chloride. Thus there is produced a mixture of the barium salt of the dye, barium sulphate, aluminum hydroxide and sodium chloride. This mixture is then filtered and washed, thus dissolving out the sodium chloride and giving a lake of the three other compounds mentioned. This lake color is very fast to light and alkali, which are the principal properties demanded for coated papers. The same procedure may be used on all acid colors, although the properties of the lake will depend upon the chemical used to precipitate the dye.

As a concrete example of a lake made according to the preceding method the following quantities of materials would be used for a red lake:

Alum	165 lbs.
Soda ash	75 lbs.
Barium chloride	192 lbs.
Scarlet 2 RR	40 lbs.

This will give about 750 lbs. of a 40% dry lake.

The yellow colors are not made from the artificial dyes but the same method and apparatus can be used in striking the colors. The manufacture of the chrome colors, as they are called, depends on the action of acetic acid on litharge forming a basic lead acetate. This is then treated with sodium dichromate which forms a basic lead chromate which is the yellow pigment desired. This pigment can be shaded to an orange pigment by heating and the addition of a little alkali. These chrome colors are very bright, have good fastness as well as good covering power, and can be made very economically.

The blue and green color lakes are frequently made from the class of colors known as the basic colors. The procedure, however, varies a little and is as follows: The alum and barium are added as usual, then the soda ash is added and the base is then washed free of the sodium chloride which is formed. This is usually done by decantation. The dye is then added and the precipitating agent follows, which is tannic acid for the basic colors. Sometimes tartar emetic is used afterward, as in cotton dyeing, to give a lake which is faster to light and washing. The basic colors have a great deal more tinctorial power than the acid colors so that much less of the dye may be used, thus reducing the cost considerably. For a green shade malachite green may be used and methylene blue for a blue shade.

In the manufacture of a black lake acid colors are again employed, nigrosine being the color most used for the black shades. Where a jet black shade is required a slight amount of yellow is used to neutralize the blue cast which most black shades seem to have. For a dull black shade a little carbon black may be mixed with the lake; this, however, is simply held mechanically and is not a chemical precipitation. A black of great brilliance, known as "Friction Black" is generally a combination of logwood and carbon black.

Not Advisable to Use Acid and Basic Colors Together

It is possible to use both acid and basic colors together, but it is not advisable because one dye is apt to precipitate the other. It is generally much better to percipitate the lakes separately and mix them later. It is true in the manufacture of lakes, as in the dyeing of cotton, that a much brighter shade can be obtained by using the colors individually than by combining two or more colors to get the same shade.

In this brief description of the methods of preparing lakes no attempt has been made to name all the chemicals which can be used as precipitants and the discussion has been restricted to those which find the greatest use commercially in preparing lake for coated papers. No dye has been recommended as the best for any given color since a change in the precipitating agent may result in a lake of very different properties. In fact the precipitating agent is one of the most important considerations in the preparation of lakes.

The advantages which the lake colors have over the use of the straight aniline colors are as follows: First, the dye after precipitation is in its most finely divided form which is not the case if the color is mixed with clay after dissolving in boiling water. Secondly, by the use of lake colors we have a blanc fixe base which is much superior to clay for colored coated papers, although it is considerably more expensive. Thirdly, where a very deep shade is to be obtained it requires considerable dye which, if used mixed with clay, requires some water to dissolve it, thus thinning down the coating mixture to the point where it affects its spreading properties considerably. Of course in the case of basic colors the clay has more or less affinity for the dye but not enough to equal the precipitating power of the tannic acid.

Bleaching Pulp at High Consistency*

By R. A. HAYWARD
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WHEN work was started on rebuilding the sulphite mill at Newton Falls, N. Y., in order to make a high grade of bleached sulphite, it was decided to install equipment for bleaching the pulp at as high a consistency as possible. This decision was arrived at because from previous experience it was found that less bleach and less steam were required to bleach at high densities, and the quantity of dirt in the finished product would be also considerably less.

Up to this time most of the mills were bleaching between 5 and 6 per cent consistency with only one installation operating at consistencies between 10 and 12 per cent. From the results obtained in this equipment it was known that it was impossible to go higher without excessive power and maintenance costs. After pulp reaches a density of about 14 per cent it begins to follow the laws and properties that govern solids instead of liquids. It was also recognized that in the bleaching operation only enough agitation is required to positively insure a uniform mixing of the bleach and stock. With these ideas in mind R. B. Wolf designed the bleachers that are now in operation at Newton Falls. The bleacher consists of a rectangular concrete tank with tile lining, and with a partition running through the center of the long way of the tank. There are two large cast iron worms in the bottom of each side and two cross worms in each end, so that the stock is carried from one end of the bleacher to the other, and is transferred from one side to the other by means of the cross worm, which runs approximately 40 revolutions per minute. The longitudinal worms run about 4 revolutions per minute.

In order to insure the uniform mixing of the stock with the bleach, and to make it possible to add bleach at one point and be sure that it would mix uniformly with all the stock in the bleacher the end flight of each longitudinal worm was reversed. This had the effect of holding approximately one-half ton of stock in each end of the bleacher and caused it to continually run back upon itself. As the stock is carried down the bleacher it merges into the mass, and an average sample is carried across into the other compartment by means of the cross worm.

After the bleacher was in operation extensive power tests were made on it, and it was found that only 50 horse power was required to operate it. These bleachers hold 5 tons of stock, and it requires about three hours to bleach the stock after all of it is in the bleacher. This makes the power requirements per ton of pulp very low. Due to the fact that the worms run slowly and the thrust on the worms is absorbed by ball bearing thrust bearings the maintenance is practically nothing.

After the bleacher had been operated for a short time it was found that the best results were obtained when the bleaching temperature did not exceed 85°F. It was also found that there was some 10-15° F. temperature rise in the bleaching, due to the heat of the reaction, so that only in the most severe weather in the winter time was any steam required to maintain the temperature, and this was only a very small amount, because of the high consistency and low temperature required.

It was also found that there was over 25 per cent saving in the quantity of bleach required when operating at 20 per cent consistency instead of 6 per cent. This makes it possible to either save bleach and obtain the average strength or it makes it possible to cook an inferior grade of wood and obtain a high strength with a relatively low per cent of bleach.

At Newton Falls there was a great deal of poor hemlock wood, as well as some wood that had lain in the pile as long as 10 years. This was all put through the wood room without any particular care in cleaning, and a clean grade of pulp was made from it. At this consistency all of the organic dirt seems to bleach out, provided it is fine enough to bleach in the same time required by the stock. Some of the wood that was cooked was so poor in quality that it would not float in the pond, and it was necessary to wheel it into the wood room in wheel barrows. Due to the fact that it was possible to make a clean quality of pulp from this wood, it was possible to use up all of this inferior wood that had been left during the last few years of operation on unbleached pulp.

*Paper read before the annual meeting of the Technical Association of the Pulp and Paper Industry, held in New York, April 11, 1923.

After the pulp is bleached in the bleacher there is a certain amount of inorganic dirt present, part of it coming with the unbleached stock, and part of it coming with the bleacher liquor. In order to remove this dirt a bleach riffler was installed, which in this case was 15 feet wide and 60 feet long. The stock flows into this riffler at approximately 0.3 of 1 per cent consistency. In the case of the soda stock only 5 per cent dirt settles to the bottom and collects on the felt. It is necessary to wash the riffler with high pressure water once a day. A great deal of care also has to be taken to see that the water used in washing the bleached pulp is entirely free from dirt, as any dirt coming into the system from this source will stay in the product.

Extensive shrinkage tests were made on the bleaching system, accurately weighing all of the unbleached pulp as it was put into the bleacher, and then again weighing the pulp after it was taken off from the wet machines. Three of these tests were made, and in each 15 to 20 tons of stock was used, so that the results would be reliable.

The overall shrinkage on hemlock pulp was 5.3 per cent, and the overall shrinkage on spruce 4.04 per cent, the chemical shrinkage being 4.37 per cent in the case of hemlock and 3.11 in the case of spruce.

Drainers were used for washing the stock, so that the stock loss from this source was very low. It of course is true that the amount of shrinkage is dependent to quite an extent on the nature of unbleached stock. In all of these tests we used what would be classed as a hard bleaching stock, so that you would normally expect a high shrinkage. It is hard to make direct comparisons of shrinkage tests, due to the great variation in plant conditions and equipment. From previous shrinkage tests made on stock that was bleached at the thinner consistencies one would have expected a shrinkage of about 10 per cent.

Tests were made on the equipment with both soda and sulphate stock. The results of these tests showed both a low shrinkage and low bleach consumption as compared with the results obtained when bleaching the same stock at 4 to 5 per cent consistency. In the case of the soda stock only 5 per cent of bleach was required to reach the same shade which was obtained with 10 per cent at the lower consistency.

Due to the fact that the stock is at a high consistency, and also because of the fact that it bleaches very rapidly, only a small amount of floor space is required as compared with other systems. Experimental work is being carried on to establish accurately the relationship between bleach consumption and consistency.

The bleach system does not require any more attention than other types that are in operation. At Newton Falls one man looks after the filling, dumping and washing of the stock, so that the labor costs per ton are very low.

Our experience with these bleachers only confirms previous theories and experiences in other plants, in that a cleaner pulp can be produced with less bleach at lower temperatures when bleaching at high densities.

Kenwood Mills Exhibit at Albany Exposition

At the recent 1923 Industrial Exposition held at Albany, N. Y., F. C. Huyck & Sons used a thousand square feet of space for the purpose of exhibiting the products of their Kenwood Mills which are located just across the Hudson River from the Capitol City. While their exhibit included their entire range of wool products, that portion devoted to felts for paper manufacturing plants was of particular interest to many of the visitors.

In this exhibit was a loom in operation working on the Kenwood Seamless Papermaker's Felt. A young lady oper-

ator from the burling room of the factory demonstrated how the ends of the felts, too long to be woven in a tube, are joined together so as to maintain a uniform thickness throughout.

There was also a complete exhibit of Kenwood tan jackets and felts, and a demonstration of the various steps taken in the manufacturing processes of this line of merchandise.

The New Valley Paper Mills

"Wisconsin's Most Modern Paper Mill" is the boast of the Valley Paper Mills now being erected at Neenah, Wis. This new enterprise, designed by Edward Wettengel, architect, and William C. Nash, general superintendent, will be devoted exclusively to the manufacture of Nash Opacity Catalogue, extra quality of French Folio, No. 1 Railroad Manila, Manifold, Flat Writing, Egg Shell Book and Lightweight specialties. The mill is being equipped with two paper machines, one making a sheet 132 inches wide, the other 142 inches in width. The average annual production will be about 15,000 tons estimated at three million dollars, based on the present market prices.

The mill property is situated on the Soo Line and the Northwestern Railroad, giving it ample and convenient transportation facilities. It is situated on an elevation above Lake Butte des Mortes and is well above the high water mark, which, aside from insuring safety, affords a rapid discharge of all waste water.

Water for the mill is supplied from springs and is filtered through Norwood Filters with a capacity for handling three million gallons daily.

The power plant will be two stories in height and will house four 400 H. P. boilers. A 1000 K. W. direct connected generator will generate the power which will be transmitted to the machines of the mill, all of which will be directly connected to motors. Coal and ashes are handled automatically.

Paper Mill Divided Into Six Sections

The paper mill is divided into six sections, namely, stock house, rotary room, washer room, beater room, machine room

Perspective of Valley Paper Mills' new plant at Neenah, Wis.

and finishing room. The stock house is large and well ventilated with ample space for storage and is equipped with thoroughly efficient dust collectors. The machine room is 80x208 feet and is large enough to admit a third large machine when wanted.

Few details, such as labor saving devices and safety measures, have been overlooked in the design of this new plant. A fifteen-ton crane, traveling the full length of the large machine room will enable two men to move any roll in a few minutes from either machine. All machinery will be carefully guarded in accordance with the Safety Laws of Wisconsin. A 1,000-gallon per minute fire pump which will be connected to the City of Neenah water works will furnish the sprinkler system in case of emergency.

Secretary-Treasurer Baker's Report

AS THE PAPER INDUSTRY was one of the last of the large industries of the country to feel the serious business depression through which the country has passed recently, so the associations in the paper industry did not get the full effect of the business depression until after the industry itself had gone through the depression. The activities of an association in any given year, and its support, are controlled pretty largely by conditions in the industry, which that association serves, of the year previous or even two years previous.

The past year, therefore, has been in a way a year of depression for the Association, in that it reflected the financial conditions of a year ago in the industry. Fortunately, because of the leadership which the Association has had in its President the depression has been a financial one only and not a depression in morale or in accomplishments.

In the report of last year it was emphasized that if there is ever a time when a trade association should be of service to the manufacturer it is in a period of difficult business depression. The past year's experience has proven this assertion in that the well organized associations have been giving more effective service to the groups which they represent, and less thoroughly organized associations have been feeling the demand of their membership for greater efficiency. That is, manufacturers have come to appreciate as never before that a trade association stands for certain definite accomplishments for the industry, and it is really fortunate that this knowledge has come to the industry, as the greater the demands for service the more effective the association should be.

It is possible that some of the associations in the paper industry, and some in other industries, have come to feel that business conditions warrant them doing certain things that are pretty generally recognized as activities that may lead to difficulties under the law. What a legitimate trade association can and cannot do has been very clearly established, and there is no need today for either a secretary of a trade association or for a manufacturer pleading ignorance as to what may be done legally under our present anti-trust legislation. Various decisions by the Courts in the so-called Linseed Oil case, the Gypsum case, the Maple Flooring case, etc., have not changed the relationship of trade associations to anti-trust legislation in any way. Most of these court decisions have dealt with particular cases of disobedience to law, and no attempt has been made in these various decisions to interpret our anti-trust legislation as it affects trade associations generally. Some associations by going a step beyond the legal limit may do certain things for their members that those members temporarily may feel to be of such great assistance that they are willing to take the risk. We deprecate this attitude and hope sincerely that associations in the paper industry will be guided by the very able legal counsel retained by these associations.

Membership Campaign

There are few organizations of men where a 100 per cent membership means as much as in a trade association. The value of the work of the association is affected very largely by the ability of that association to represent the industry effectively with other national organizations, before the public, and before the law-making bodies of the federal government and the states.

A membership campaign carried on during the last six months of the past year emphasizes the above statement, which was made in the report of last year. It was urged that last year an aggressive membership campaign be carried on but such a campaign was delayed, as it was the year previous, because of unsatisfactory business conditions. However, the membership campaign has been under way for nearly six months with very satisfactory results.

A personal letter was written to every one of the nearly 400 members of the Association explaining the need for better representation of the entire industry, and asking that each member secure one new member. This letter brought a surprising number of replies from the membership and in some cases members went to the trouble of writing numerous personal letters in behalf of the Association. Literature was prepared for this campaign, telling of the past year's activities in the Association, and this literature taken out to mills not now members by the personal activity of the membership has resulted in adding to the membership of affiliated associations and to the membership of this Association directly. This personal work has been so satisfactory that it will be continued as a year round membership campaign.

Getting Acquainted with Manufacturers

It has become increasingly clear, as your secretary has carried forward the work of the Association, that one of the difficult problems in a federated trade association is the bringing about of real acquaintanceship between the secretary and the executives in the industry, particularly those executives who are active in affiliated associations. The average executive very rightly considers his first allegiance to be his affiliated association and the giving of this allegiance sometimes exhausts his interest in and the time which he has to give to trade association work. In other words, as we have gone to the manufacturers with the activities of the American Paper and Pulp Association they have often been exhausted in the activities of their affiliated associations and have little time for the federated organization.

To meet this problem of acquaintanceship an effort was made by the secretary to get acquainted by personal visits at the mills. One paper mill section was chosen and the secretary spent some little time in calling at the mills. He was never received other than in a very courteous, kindly way, but to attempt to interest the executives in the activities of the federated association in their own offices, where they have the pressing daily problems directly in front of them, and where others are waiting to see them in this matter and that, proved to be an unsatisfactory solution of the acquaintanceship problem.

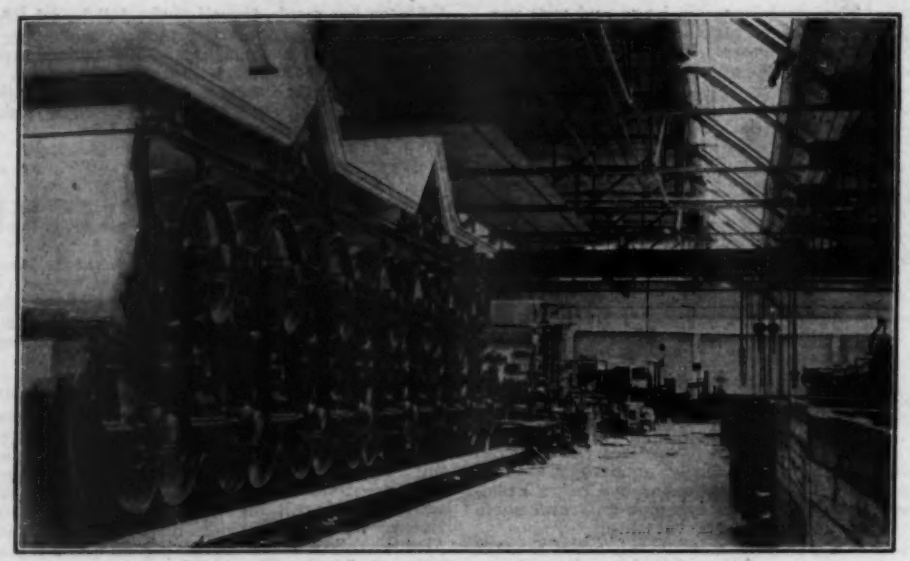
After going over the situation of "getting acquainted" carefully it was finally decided to go into the different papermaking sections for the holding of luncheons of paper manufacturers. During the last six months of the year luncheons were held in Richmond, Va., Middletown, O., Wausau and Neenah, Wis. Arrangements for these luncheons were made by local executives in those various sections, and your officers are very appreciative of the help which these various men gave in making these luncheons successful. The holding of these four luncheons has proven conclusively that this is a method of getting acquainted that is both more effective and more economical for the secretary of a federated association than generally to attempt to make personal calls at all of the mills.

Your Executive Committee has been urged to make these luncheons an annual affair, and the suggestion has been made that next year the President or a member of the Executive Committee accompany the secretary, and it has been urged also that in connection with these luncheons specific problems, such as uniform cost systems, income tax matters, technical matters, and similar problems before the industry, be presented and discussed.

Forms of Service by an Association

There are two forms of service given by all of the associations in the paper industry. The first and most effective form is what might be called "direct service," such as preparation of statistics, the holding of meetings, the giving of information as to raw materials, traffic conditions, and the personal work of the secretary given in the form of prompt replies to inquiries of all sorts. The second form of service is the representation of the group which the Association serves with other groups in the industry or with other industries; the watching of helpful and harmful legislation which the Association is always in position to work aggressively for or against, and, finally, the representation of the group before the public.

The problem before this Association has been to develop more effectively the first form of service to its membership, that is, direct service and that without conflicting with the effective work of the affiliated associations. There is an amazing amount of indirect service which your Association is giving constantly, which it is difficult to measure the value of or to report upon in a satisfactory way. That the forms of service given by the Association might be clearer to the



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entire membership we have issued the past two years leaflets telling of the accomplishments of the Association. The leaflet this year is entitled "Forward Steps in 1922." It would be out of place to record here the major accomplishments of the past year. It is in place here, however, to emphasize the fact that with the effective, aggressively working organization which you now have in the American Paper and Pulp Association we are able to give very direct service in the answering of almost any inquiry as to the industry.

You have assisted in the upbuilding of our Information Service, which will be reported upon briefly later. The work of this Information Service in taking the industry to the public has brought a surprising number of inquiries from all sorts of sources to the Association. These inquiries come from banks, business houses, schools, and colleges, foreign countries, and from the public at large. Very many of these inquiries indicate gross ignorance as to the paper industry. Your Association feels that it is a very distinct value to you that there be less of ignorance and more of real information as to the industry on the part of banks and business houses and the public. We are hoping that the membership generally will make greater use of the ability of the Association to reply promptly to an inquiry as to any phase of the industry.

Service Association Assisting in Direct Service

The presence in the offices of this Association of the Technical, the Cost, and the Salesmen's Associations, who have been at all times very ready to give of their time, has made it increasingly possible to answer questions as to technical matters, cost and income tax matters, selling problems, and other phases of activities of our industry in which these various associations are interested.

We are hopeful that the Superintendents Association, which has been doing excellent work for its own membership and for the industry, may be brought to work more closely with this association directly or through the Technical Association. The Superintendents Association is gradually accumulating a mass of information, based upon practical experience, which should be made available to the entire industry—as, after all, the service associations are in existence to serve the industry as well as their individual membership.

Activities of Committees

The policy as to committee activities adopted a year ago, that is, the doing away with standing committees and their replacement by special committees appointed to do a particular piece of work has been carried through the past year. The standing committees have been kept up only as there seems to be special work to be done through the year. The adoption of this policy has proven wise and will be carried through the coming year.

It was pointed out last year that a considerable number of standing committees, presumably active upon different phases of work of the Association, may make an excellent showing in a secretary's report. However, where a standing committee is in existence and where it is not definitely engaged in active work there cannot but be a feeling on the part of the members of that committee, that if the committee itself is not active, the Association is not at work.

Several committees have been active during most of the year. The Tariff Committee, of which Mr. Henry W. Stokes is Chairman, while not having as much to do as during the previous year, has been constantly on the watch to see that the interests of the industry are taken care of in the activities of the Tariff Commission and other governmental agencies. A short report by Mr. Stokes' Committee appears on another page.

The Committtee on Forest Conservation has been continued and its Chairman, Mr. George W. Sisson, Jr., has appeared at meetings and hearings in Washington and Albany in defense of the industry. Regardless of the way some of the mills may feel as to the value of work put upon forestry, this subject promises to be one of the big questions before all of the wood-using industries. The Association has a real piece of work to do through its Committee on Forest Conservation, in not only watching harmful legislation but in assisting in the development of constructive legislation and in taking part in activities that are essentially educational in value as well as helping directly in making our forests and forest lands more productive.

The two special committees appointed last year, one the Advisory Committee from the Paper Industry for the Paper Section of the Bureau of Standards, of which Mr. Arthur H. Nevius is Chairman, and the other the Committee for the Department of Commerce, of which Mr. W. J. Ravbold is Chairman, have both been active and have accomplished real results for the industry.

Brief reports from the Advisory Committee from the Paper Industry for the Paper Section of the Bureau of Standards, and from the Committee on the Department of Commerce, will appear later.

The Committee on the Department of Commerce has been received so cordially by that Department, and has been so helpful in representing the industry in certain matters in Washington, both before the Department of Commerce and other Departments, that another committee has now been proposed to represent the paper industry in the work of the United States Department of Agriculture, primarily in the work of the Forest Service, a Bureau of that Department. Some suggestions as to personnel have been made to Secretary Wallace and it is expected that the committee will be appointed soon.

Information Service

This Service was organized in 1921, under a special fund which had been contributed by both members and non-members. Mr. Warren B. Bullock, a trained newspaper man, was placed in charge of the Service and there seems now to be no further questions as to the very important work which such a Service can do for our membership and for the industry.

Mr. Bullock has not only greatly improved the regular Bulletin of the Association, but he has done much in giving the Association and the industry representation in the public press and in trade journals of this industry and of other industries. This Service has become increasingly, during the past year, an Information Service. General inquiries coming to the Association are taken care of by this Service and there is being developed a mass of information that should be increasingly valuable to our membership.

The part which the Association has played in the Paper Industries Exposition, which is being held for the first time this year, has been carried through largely by the Information Service. Mr. Bullock has worked constantly with the International Exposition Company, which is putting on the Exposition, and has helped materially in making the Exposition really representative of the entire industry.

Probably the most valuable work which the Information Service has done the past year is the securing of direct contact with a large number of banks in the various paper-making sections. This Service carried through in 1922 an organized campaign to bring out larger supplies of waste paper to meet the emergency shortage. It organized monthly service on general market conditions for paper manufacturers, and it has been very helpful in the house slogan activities among the members of the Association, and in supplying moving picture films, slides and exhibit material, not only to our members but to non-members as well.

Woodlands Section

The Woodlands Section was organized in 1920 for the purpose of bringing together the executives and the men in those companies having to do with the handling of forest property. For the first time in its many years of active work the Association, through this Section, has been providing accurate statistics as to the wood situation, as it affects the paper industry. Wood is the raw material of a very large part of the industry and it is increasingly important, in view of our diminishing forest areas, that we should have information of an accurate character as to available supplies of wood, both in this country and in Canada.

Mr. O. M. Porter, Assistant Secretary of this Association, has carried through the entire development of this Section in a way that has been of unusual service not only along the lines of statistics, but to the men actually handling timberlands for pulp and paper manufacturers. In fact, the work of this Section has been so satisfactory that request has come from the Canadian Pulp and Paper Association that statistics and information sent out from our Woodlands Section should be sent to members of the Canadian Woodlands Section, and at their expense.

Necessity for Better Knowledge of Foreign Affairs

Since coming into the Association in 1920, your secretary has been impressed constantly with the necessity for better knowledge of not only Scandinavian conditions but conditions on the mainland of Europe, and market conditions in South America. Many of our paper mills have come to depend upon the high grade pulp turned out by the Scandinavian mills, and while the amount of that pulp brought into this country in any one year may not be large as compared with the total amount of pulp consumed, nevertheless it is large enough to affect the market for pulp in this country, and the output of our domestic pulp mills. This fact has been made increasingly clear as the result of the pulp strike in Sweden the past months, regarding which the Association has kept the industry thoroughly well informed.

THE WOLF RELIEF COOLER

for Reclaiming Relief Gases from Digesters Employed in the Production of Sulphite Pulp

The Wolf Relief Cooler for the efficient recovery of waste gases incident to cooking sulphite pulp and permitting the use of water warmed in the process of cooling for washing purposes.

Read: "These coolers were cut into our liquor and gas relief line on Friday last and comparing their performance with that of the old style flat cooler we find that the temperature of the storage acid has dropped from 34 deg. C to 22 deg. C."

Write for Information

WOOD PREPARING EQUIPMENT FOR GROUND WOOD AND CHEMICAL FIBRE MILLS

Chip Screens—Woods Ideal Chip Separator—The Ryther Shredder for the primary reduction of dry, partly dry and partly frozen ground wood and chemical fibre laps, sheets and boards preliminary to bleaching, beating or mixing.

RYTHER & PRINGLE COMPANY

CARTHAGE, NEW YORK

It seemed to your secretary that he could be of greater service to the membership if he could have personal knowledge of Scandinavian conditions. The suggestion was made, therefore, to the President of the Association that he be allowed to spend the past summer in Scandinavia. While the Association could not and did not finance the trip to Scandinavia, nevertheless the trip was made and the beneficial results of this trip have been felt, not only by the secretary but by the industry at large. Your secretary was very greatly assisted in the Scandinavian trip by Mr. George W. Sisson, Jr., of the Racquette River Paper Company, a past President of the Association, who made the trip at his own expense. While Mr. Sisson made the trip because of his own interest in foreign conditions, yet the presence in Scandinavia of an American manufacturer with your secretary made it much easier for the Association to secure the information desired, and made the reception of your secretary much more satisfactory and worth while.

The results of the Scandinavian trip have been reported in part to the membership, and the recommendation has been made that small groups of technical men from our industry be sent to Scandinavia annually, and that from time to time groups of executives visit the pulp and paper mills of Scandinavia. We would like to repeat this recommendation and urge that means be developed to keep in much closer contact with the whole European pulp and paper situation.

In this connection, it is in place to emphasize that the paper industry of this country is concerned with the development of a foreign market. Many manufacturers will say at once that we are not concerned. However, when it is known generally that the value of our exports of pulp and paper goods in 1920 was over eighty million dollars and in 1921 over fifty millions dollars, and in 1922 over twenty-four million dollars, it will be appreciated that we have a foreign market and that there are great possibilities for increasing this market. The South American market is logically our market rather than the market for the European mills, and we will have that market when we make the proper effort to secure it and hold it.

Contact with the Federal Government

It is safe to assume, and many of our manufacturers will assert as the result of more or less expensive experience, that the Federal Government is continuing with passing years to take greater cognizance of economic conditions generally, and of the individual business of paper manufacturers, and all of the other manufacturers of the country. So long as this is the case it would appear to be wisdom for the industries generally to develop more effective cooperation as between the business men of the country and the Federal Government. To put it in another way, there are mighty few arguments against such cooperation. When the Federal Government, through its tax laws, tariff regulation, the activities of the Federal Trade Commission, and the Department of Justice, can pretty nearly control the success of business, it would seem logical that manufacturers and business men generally should come together and work actively with all of the departments of the government at Washington for the sake of protection, if for no other reason.

During the past three years, we have made very definite effort to bring the paper industry into the right contact with the various governmental bureaus and with Congress. The visit of some 14 paper manufacturers, making up in part the Committee on the Department of Commerce to Washington in January, where they met Secretary Hoover and the Director of the Bureau of Foreign and Domestic Commerce, and where they had at lunch with them General Lord, the Director of the Bureau of the Budget, and later spent an hour with three of the members of the Tariff Commission, is indicative of what may be accomplished in developing a contact that makes it possible for the government officials to visualize the industry and to appreciate that the paper industry is in the control of business men of standing and vision. After all, business is done in our industry on the basis of acquaintanceship and good faith. Satisfactory business relations with the government must be based upon the same conditions.

Your secretary is the last man in the industry to suggest that we should run to Washington with every little problem that comes up in the industry. On the other hand, he believes wholeheartedly that reasonable and effective cooperation with the government bureaus in Washington will reflect beneficially upon the entire industry.

Income Tax Activities

Your attention has been directed before to the fact that the industry has spent a good deal of money and has done very effective work in the past through the Income Tax Questionnaire Committee of the Association. With the comple-

Announcement

to the

Paper and Pulp Industry

Bitumastic Solution and Hermastic Enamels have for a number of years been used satisfactorily in numerous industries, for the protection of metal surfaces coming in contact with atmospheric conditions which are conducive to corrosion.

So busy have we been supplying the demands of other industries that, until recently when paper and pulp mills began to make inquiry about our coatings, we have somewhat neglected this field. We are now, however, prepared to discuss your problems of corrosion and their possible elimination.

BITUMASTIC

WHAT IT IS

This material is a black, Bituminous composition, which has been found to be very satisfactory when subjected to moisture such as condensed steam, acid fumes and vapors. Used on hot steam pipes, boiler fronts, smoke stacks, and all kinds of structural steel surfaces, air ducts, ventilating fans, tanks, digesters and all such places where the corrosive conditions are severe and where constant repainting is necessary in order to preserve the surfaces from rapid corrosion.

It is applied the same as ordinary paint; dries quite hard in five hours; gives a lasting, brilliant black finish. It costs about fifty per cent less than a good lead and oil paint.

HERMASTIC

WHAT IT IS

This material is used quite generally in industrial plants for lining steel coal bunkers and ash hoppers, where, as every engineer knows, corrosion is very rapid.

It is applied in the following manner: The surface of the steel is thoroughly cleaned and dried and a priming coat of W. D. H. Priming Solution is applied cold like ordinary paint. This is allowed to set for about five hours after which the Hermastic Enamel is applied by means of Special Tampico fibre daubers, while in a hot molten condition. It leaves a coating on the steel of about $\frac{1}{16}$" thickness and insures lasting protection to the inside of the coal bunkers. Due to its very high melting point it neither sags under extreme heat nor cracks under extreme cold.

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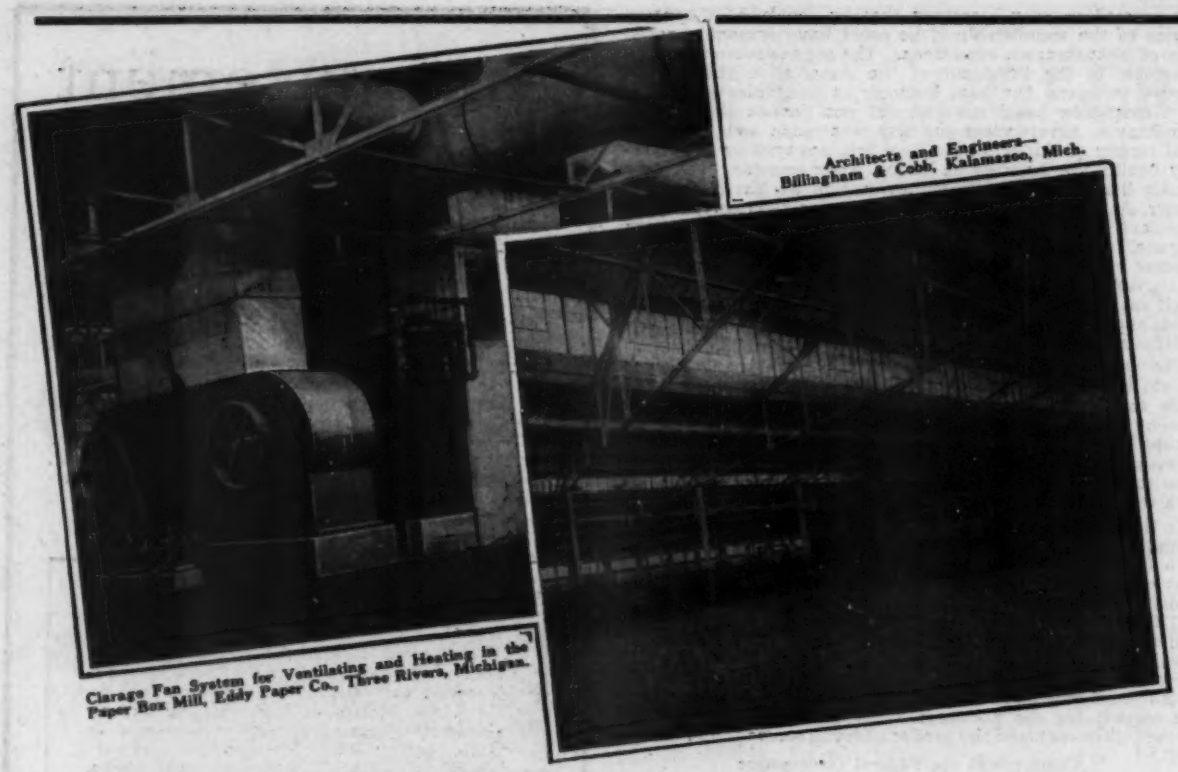
322 So. Delaware Ave. Philadelphia

Kirby Building Cleveland



Clarage Fan System for Ventilating and Heating in the Paper Box Mill, Eddy Paper Co., Three Rivers, Michigan. Architects and Engineers—Billingham & Cobb, Kalamazoo, Mich.

The profit-making applications of fans in paper mills are many —*if they're the right fans*

The Right Fans for These Services—

Ask the Clarage Engineering Department for descriptions of Clarage-Kalamazoo Fans in these services:

Heating and Ventilating

In heating systems, in ventilating systems, or in combination heating and ventilating systems with or without humidifying systems, Clarage-Kalamazoo Fans are helping mill workers attain greater daily production by supplying them with clean fresh air at the right temperature.

Pneumatic Conveying

Raw stock is conveyed from one department to another through pipes by moving air supplied by Clarage-Kalamazoo Exhausters and Blowers; handling costs are greatly reduced.

Dust Removal

Clarage-Kalamazoo Exhausters are making mill atmosphere more healthful by withdrawing dust and by exhausting poisonous or obnoxious odors or gases.

Vapor Removal

In the machine room water vapor condenses on the machines or on the roof, from where it drips down onto the paper in manufacture. Clarage-Kalamazoo Fan Drying Systems prevent this condensation.

Mechanical Draft

A Clarage-Kalamazoo Fan direct connected to a Clarage-Kalamazoo Type V Vertical Engine is the unfailing combination for economical mechanical draft for the boiler room.

IN THE last few years fan development has advanced by leaps and bounds—faster than the ordinary paper mill operator's knowledge of fan application.

As a result, in the average mill there are many places where the installation of the right fans would make money, either directly by cutting operating costs or indirectly by raising the quality of the product or by bettering working conditions.

Clarage-Kalamazoo Fans are the *right* fans; Clarage engineers are the men who can point out the profitable applications—suggested by the listing opposite.

Clarage Fan Company, Kalamazoo, Michigan

New York City Cleveland Detroit Philadelphia Indianapolis Minneapolis Memphis Pittsburgh Los Angeles Chicago Rochester, N. Y. New England Elec. Equip. Co., Boston

Complete fan stocks carried in New York, Pittsburgh and Memphis

CLARAGE — KALAMAZOO

Fans—Blowers—Engines

tion of the questionnaire the work of that committee ceased. Income tax as a form of taxation has come to stay and will be a problem which all must face for many years to come, yet we stopped our unified action with the closing up of the work of the Income Tax Questionnaire Committee, and are now struggling along as individuals to meet the situation which other industries are meeting in a cooperative way—to their great advantage.

The Association is not seeking to add to its force except where service of real worth can be given the membership. Your secretary has appeared before meetings of some of the affiliated associations, urging that an income tax expert or an income tax bureau be placed in the Association. This was urged not that it is expected that an income tax expert would assist any single mill to fill out its returns, but rather that there be a man who understands the income tax laws thoroughly as affecting this industry who could keep in touch with the situation at Washington, and who could go into each of the paper-making sections in any given year to go over the technicalities of the law and recent rulings of the law, with groups of men who are making out returns for the various mills. Knowing what other industries are doing along this line, and how they are profiting as the result of such activities your secretary would be remiss if he did not continue to emphasize the vital importance of a cooperative activity such as could be made of great value through an income tax bureau.

In the same way, a very important piece of work could be done for the industry by having in its employ a man who understands thoroughly the importation of pulp and paper. Every time that a shipment of paper is brought into this country and undervalued, or wrongly classified, it injures the industry. No one can estimate the amount of paper that is being brought in and wrongly classified and undervalued. In a small way the Association is keeping in as close touch as it can with customs officials at the port of New York, and elsewhere, and the specific cases which the customs officials of New York have brought to the attention of the Association in the past six months are clearly indicative of the very great help which could be given the entire industry if this work could be handled in an effective way. Furthermore, such a man could keep the industry thoroughly informed as to the pulp coming into this country, how much is in warehouses, etc. The value of this information does not need to be enlarged upon.

The two activities just described and recommended as important activities to the industry are good examples of the general service which a federated organization such as this should be able to give to the industry but which it is difficult often for a single manufacturer to see clearly as of definite advantage to him. It is the old story that everybody's business is nobody's business. Yet your secretary is so convinced of the necessity for service along these lines that he will continue to emphasize them with the hope that eventually such service may be given, and that in a way that will be immediately appreciated and the wonder will be then why such service was not given before.

Next Year

With improving business conditions, next year should be a much better year for all of your associations. Your secretaries count the year a better year when there is greater opportunity for service, and when they feel that they have made their work count for something in the upbuilding of the industry. Progress has been made the past year, and if it is true, as the economists are seeking to prove, that we are facing a long period of declining prices when competition will be keener and the margin of profits smaller, then your Associations should be of increasing service in helping you by every lawful means to continue business at a profit even with declining prices and a narrower margin of profit.

The fundamental need the coming year is for a sounder and a more effective method of financing this Association. It should not be necessary for your secretary to spend a half to two-thirds of his time in trying to solve the problem of financing the association's activities. This is an old association and it has been in existence long enough for a very definite conclusion to be reached as to the value of its work. Either the work is worth while or it is not. If it is worth while it should be supported in a reasonably effective way. If it is not worth while the association should be wiped off the slate and forgotten.

The Association is worth while and three years of service with you has made me believe tremendously in the industry, in you men who make up the industry, and in the Association. Your secretary is convinced that if this Association should be wiped out tomorrow that you would be forced to have

Paper Mill Machinery in Stock Furnished Rebuilt and Guaranteed

"Not Where Is and As Is"

COMPLETE PAPER MACHINE—80" trim. Made by Pusey & Jones. Fourdrinier, two presses, 28 dryers, one stack of calenders, reel, winder, marshall drive.

FOURDRINIER TISSUE MACHINE—One 68".

FOURDRINIER PARTS—Pusey & Jones 112", 100" equipped with new Century shake. 96" Kutter Trowbridge.

PRESS PARTS FOR PAPER MACHINES—Pusey & Jones bell crank housings and Black & Clawson swing arm housings. Press rolls 18"x110" and 20"x88".

DRYERS—Four 48"x111". One 36"x80". Two 36"x84". Nine 36"x82". Two 36"x74". Four 48"x72". Four 48"x68". One 84"x67". Eleven 42"x80". Eight 36"x62". Two 36"x48". Four 20"x39".

CHILLED CALENDERS—One 82" seven roll and one 84" nine roll made by Farrel. One 86" six roll. One 82" five roll. One 66" five roll. One 88" five roll. One 54" five roll.

SLITTERS AND WINDERS—One 84" four drum and one 72" two drum M. & W. winders with slitters. One 126" Warren. One 108" Kidder. One 46" Langston. One 40" Kidder. Two 48" core cutting machines.

BEATERS—Three 73"x13", two 54"x54" N. & W. One Holyoke 54"x90". One Dilts 62"x50" iron tub. One Jones 62"x52". One Dillon 60"x48". Two Emersons 54"x50". Three Downingtown 54"x42" iron tubs. One Jones 42"x38". Six Horne 36"x36". One N. & W. 36"x36". Two No. 2 Claflins.

JORDANS—Two Jones Imperial. Two No. 2 Dillon Improved. Two Monarchs. One large and two small Horne. One Jones Standard. One small Emerson. One Appleton Wragg Majestic. Four Stevens digesters. One Pope breaking.

SCREENS—Three 12 plate. Two 8 plate open side Packer. Two 6 plate. Three white auxiliary and one Moore & White auxiliary. One single cylinder Wandel.

STUFF PUMPS—Deane triplex 9"x8". Goulds triplex 8"x12". Goulds tripler 6"x12". Beloit duplex 6"x14". Two P. & J. duplex 8"x10". Two 6" P. & J. single plunger. Twelve 5" post stuff pumps.

REVOLVING SHEET CUTTERS—42" and 84" Moore & White. Four 60" and one 62" Hamblets. One 48", one 45" and four 60" Finlays. One 62" and 62" and 48" Clark. One 50" Hamblet diagonal.

REAM CUTTERS—Two 48" Acme. Two 42" Cranston under cut.

SUPER CALENDERS—One 52", one 45", one 42", one 36" Holyokes. One 45", one 40" P. & J. One 45" Granger.

WET MACHINES—Four 72" Bagley & Sewall hydraulic. One 58" N. & W.

ENGINES—American Ball variable speed 120 H. P. and one 7"x10", one 10"x10". One 12"x30" Putnam.

Two Daniels Rag Cutters — One Manistee Hog Chipper
One 50" Farrel Board Calender — One Ryther & Pringle Shredder
One screw and two hydraulic Holyoke presses

We have a large number of pumps and over five hundred calender, press and couch rolls in stock

FRANK H. DAVIS COMPANY

175 Richdale Ave., Cambridge 40, Mass.

Efficient Heating

Demands radiators so constructed that every square foot is prime heating surface.

Bayley **Chinook Heaters**

are built on the "Tube-Within-A-Tube" principle, every tube a complete radiator in itself, free from water hammer, return bends, elbows and nipples. Any tube can be removed without interfering with any other tube. Can be shipped K. D.

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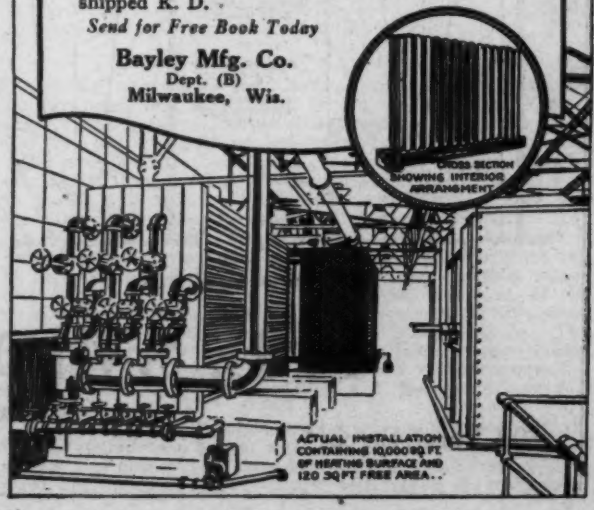
Bayley Mfg. Co.
Dept. (B)
Milwaukee, Wis.



THE BEATER—and the LENIX

A NEW paper mill in Pennsylvania has just installed motor driven beaters with LENIXES, as illustrated. This adds another to the list of mills now using this method of drive.

When two or more Beaters are driven from one motor, the LENIX gives an ease and independence of operation of the individual Beaters that is not obtainable by any other means of driving several units from one motor.

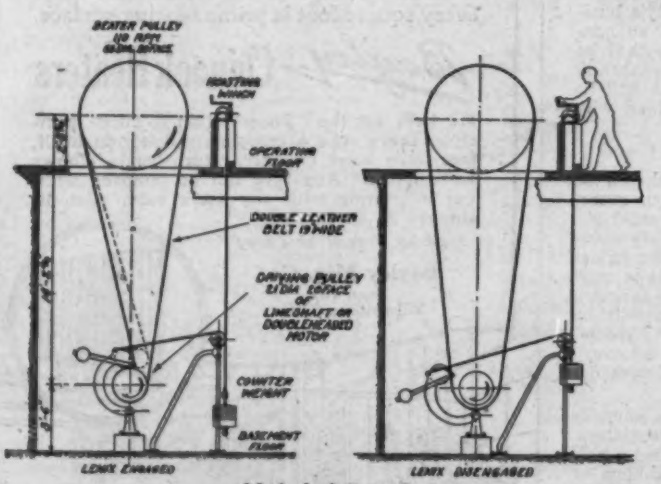
One of the Beaters may be stopped without interfering with the others. Uneven stretch of the belts is taken up automatically by the LENIXES, eliminating the stops usually made to shorten new belts, and increasing the arc of contact on the motor pulley.

The motor and LENIXES are located on the floor below the Beaters, giving an operating floor free of encumbrances.

Booklets

"Saving Slippage and Space" and
"The Lenix Drive in the Paper Industry,"

are interesting. Send for Copies



Method of Control

Five Points

1—The Lenix increases the arc of contact between belt and pulley.

2—The Lenix maintains constantly and accurately the proper tension in the slack side of the belt.

3—The Lenix saves floor space, building space and belting because of freedom in pulley locations.

4—The Lenix saves in bearing friction, lubrication and renewal of bearings because of reduced bearing pressure.

5—The Lenix permits the use of less expensive, high speed and high efficiency motors or generators because of the higher pulley ratios.

F. L. SMIDTH & CO.

Engineers

50 Church Street New York

The New Glatfelter Paper Mill

A RECORD was made in the building of the new paper mill for the P. H. Glatfelter Co., of Spring Grove, Pa. The engineers and men of the building organization, the Aberthaw Construction Co., of Boston, arrived on the ground on January 20, 1922, and left September 15, 1922—a period of less than eight months. They left behind them a number of new buildings, constituting the new unit to the mills of this company.

Fifty years ago the paper mills of the P. H. Glatfelter Co. were quite pretentious for their day, and constant improvements and changes in everything but their name have now made the company's property one of the best in this country. In order that the new paper machine, which the builders claim to be the largest machine in the world making high grade book papers, might be located in a position in which the flow of raw materials and finished products should parallel the general arrangements of the old mill, it was necessary to construct a new filter plant, bridge the head race and the tail race, re-roof the finishing room and rearrange the heart of the mill and town water supply system.

Aeroplane view of the Glatfelter mills

The construction of the buildings is fireproof throughout, being of steel, brick and concrete, with gypsum roofs. It might be noted here that during the past few years this company has had most of their buildings roofed with gypsum, which in all cases and under all conditions has given the best of satisfaction. The Keystone Gypsum Fireproofing Corporation, of New York, furnished the roofs for the new buildings.

Storage of raw materials has been provided in a new storage building, 85x100 feet. The basement is used entirely for the handling of clay, having a storage capacity of seven hundred tons. The clay is unloaded from the railroad cars directly into a conveyor system, which distributes it throughout the bin. The clay mixer is also located in the basement. The conveyors to handle the clay, as well as those to handle pulp, were furnished by R. L. Latimer Co., of Philadelphia. Other raw materials are unloaded directly from the cars to the first floor of the building, by means of electric overhead hoists, furnished by the Reading Chain & Block Corp., Reading, Pa. Lannoye pulpers, made by Rice, Barton & Fales, Worcester, Mass., are located in this building. The pulp is taken from these machines by means of conveyors and bucket elevators to bins over the beaters in the next room. The beater room is 47x69 feet, with stock chests in the basement. The monster machine is in a room 273 feet long, and 55 feet wide. This department, as all of the others, has large window surface, with steel sash, giving an abundance of good light.

The old finishing room has been merged with the new one, and combined they furnish 15,818 square feet of space. A loading platform on the side accommodates six cars at one time. Howe scales of the dial and recording type have been installed wherever needed.

A storeroom for machine clothing has been built, as well as separate space for lockers and wash rooms. Under all of the buildings is an eighteen-foot basement for storage. Craig Ridgway elevators have been installed.

Kutter-Trowbridge Type of Fourdrinier

The big machine is a wonderful product of the machine builders' art, and is what is known as the latest Kutter-Trowbridge type of Fourdrinier machine, 170 inches wide. The Fourdrinier part is so designed that it is removable. The rolls, save-all trays, wire rolls, etc., remain in place, thereby eliminating a big task when changing the wire. This is said to be the first machine the builders, the Black-Clawson Co., Hamilton, Ohio, have equipped with this new method.

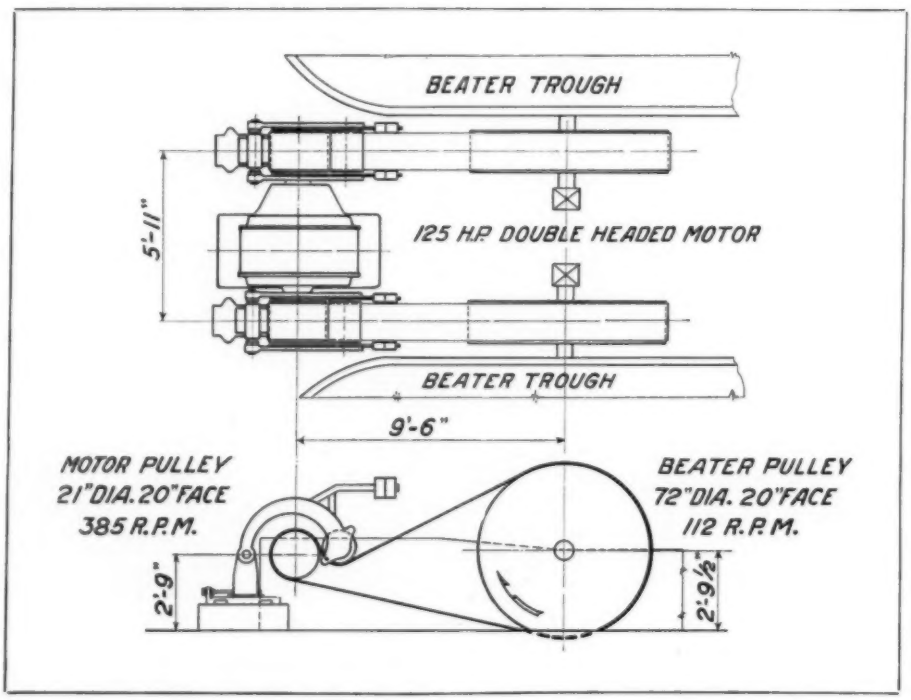
S.K.F. ball bearings are used on all of the rolls where it has been found practicable. A Millspaugh suction couch roll is part of the machine equipment. Large concrete sumps under the couch roll and Fourdrinier part catch all of the surplus stock, which is pumped over two pneumatic type save-alls, furnished by the Improved Paper Machinery Co. The waste water from the save-alls flows to large storage tanks, from where it is used over again. Nash rotary pumps are used to take care of the suction roll, flat boxes and felt suctions.

There are three presses, supported on heavy cast iron frames of improved design with hollow water legs. The felts on the first two presses drop into the basement, running forward, and the third press reverses, with felt on the main floor.

USE
"DEPENDOTAN" Leather Belting

Designed Especially for

The LENIX Short Centre Belt Drive



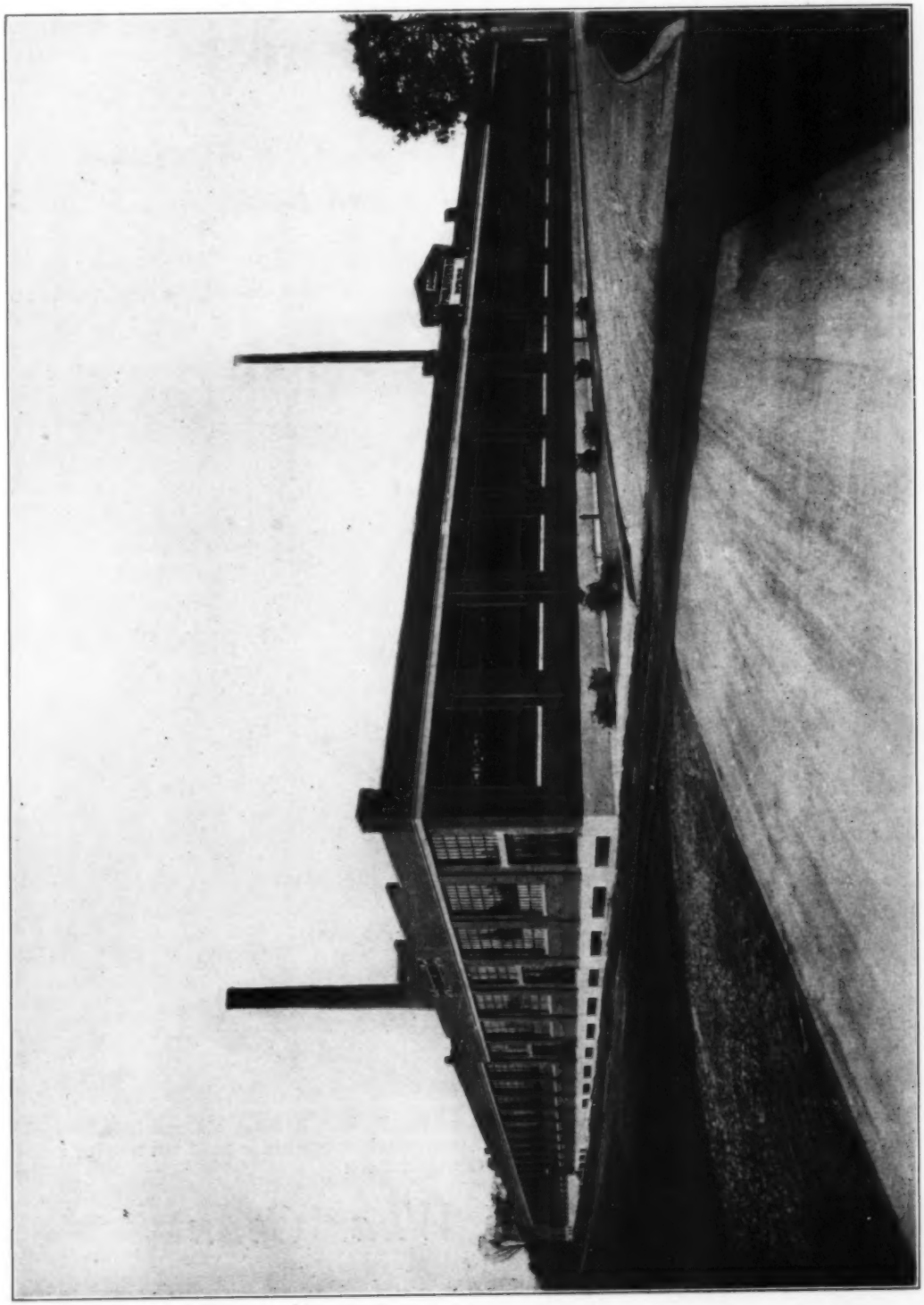
Many paper manufacturers have found in the "DEPENDOTAN" Belt on LENIX DRIVES the element of elasticity in power transmission which is so desirable in motor driven Beaters and Washing Engines and which is more or less absent in geared or chain driven units. This feature is combined in the Lenix Belt Drive with the same economy of floor space of the geared or chain drive.

HIMMELEIN & BAILEY

Manufacturers of High Grade Leather Belting

246 and 248 Chestnut St.

PHILADELPHIA, U. S. A.



View of new Glatfelter mill buildings

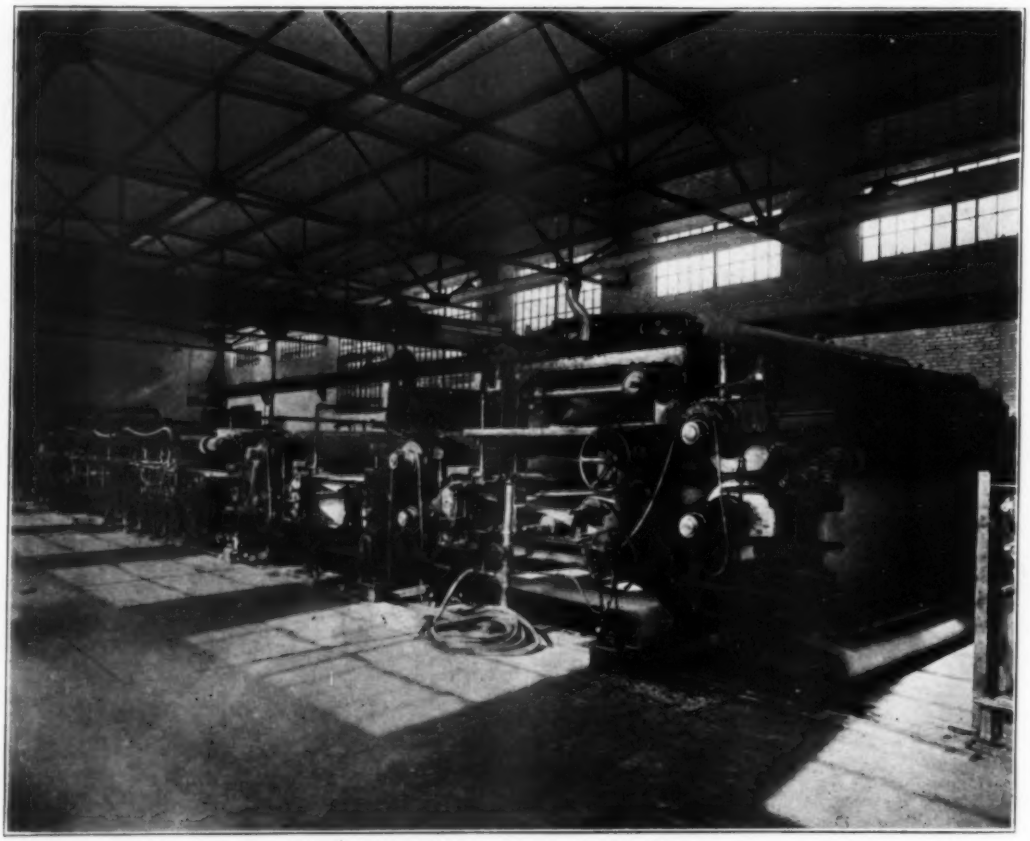
The BLACK-CLAWSON COMPANY

HAMILTON, OHIO

ESTABLISHED 1873

Day by Day, in Every Way, Our Machines Are Getting Better and Better

Dependable in material and workmanship. They are built in a specially equipped factory, the largest of the kind, with a force of skilled mechanics and with the precision of machine tools.



Above cut shows Press and Fourdrinier part of the P. H. Glatfelter Co. machine, world's largest High Grade Book Paper Machine. There are wider machines built but not for making HIGH GRADE Book

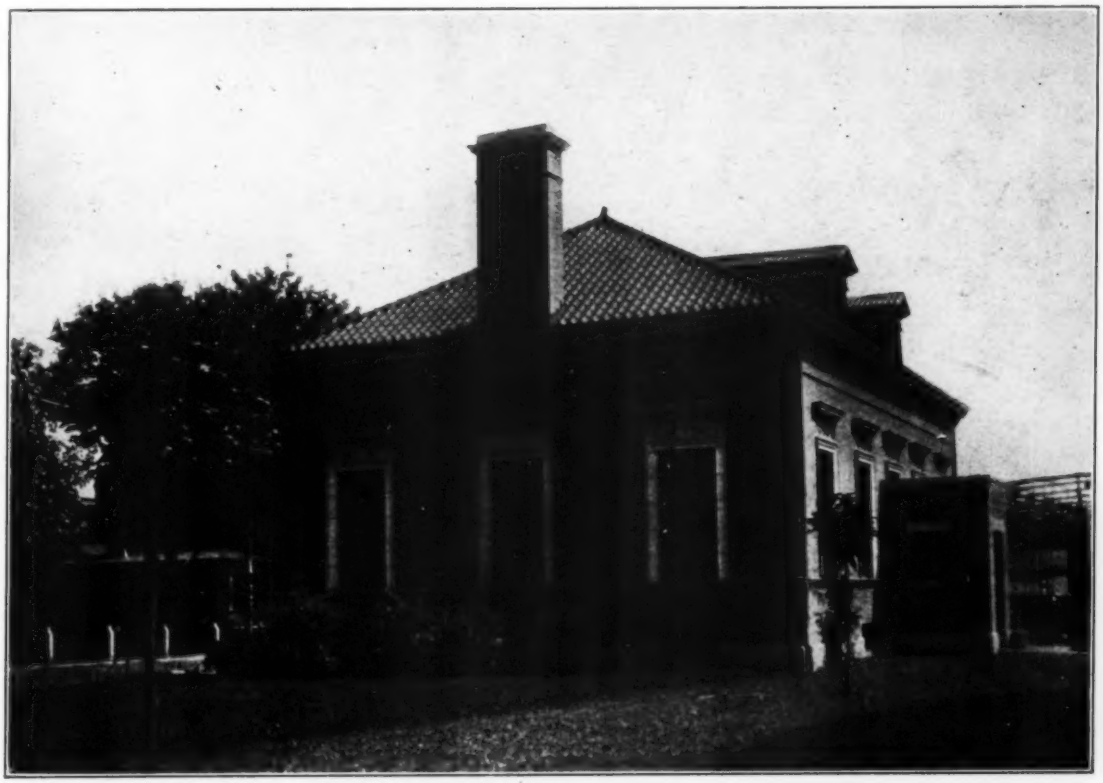
Results Are What Count

Installed Anywhere and Everywhere by Our Experts

All bottom press roll bearings are so designed that the bearing itself need not be removed when putting on a felt. The top roll bearings are of the swinging arm type, raised and lowered by means of a brass screw and ratchet device, and rolls are weighted by compound levers and weights. The top rolls of the first and second presses are of granite, furnished by B. F. Perkins & Son. They are twenty-six inches in diameter.

All press roll bearings are water cooled and ring oiling with liberal bearing surface, with special machinery to keep oil from running from bearings onto felts. The doctors are of the vibrating type. The first press is equipped with a "broke" conveyor, which eliminates the handling of all "broke" by hand. Automatic guides take care of the press felts.

A conveyor takes the paper from the third press to the dryers. The dryers section consists of thirty dryers, sixty inches in diameter by one hundred sixty-four inch face. There is one pony dryer and two felt dryers forty-eight inches in diameter. All bearings are bronze bushed and ring oiling, with removable bushings.



Office building of the Glatfelter Company

All gears are machine cut, which insure noiseless operation, neatly covered by cast iron guards. The packing boxes are of the Savery metallic safety type. All bottom dryers are equipped with doctors.

The calendering processes on this machine are accomplished with two calenders, one consisting of seven rolls and one of nine rolls. These calendars are manufactured by the Farrel Foundry & Machine Co., and consist of 28-inch bottom roll, 18-inch next to bottom, 13-inch intermediates and 18-inch top, all rolls 162-inch face.

There has been installed a Hamblet Machine Co. duplex cutter, which is claimed to be the largest one ever built. This machine is capable of cutting or handling ten rolls at a time, each roll 160 inches wide. From the cutter the sheets go to a Hamblet lay-boy.

Sectional Paper Machine Drive

The sectional paper machine drive, which was developed during the first part of 1920 has undergone a natural process of development and improvement, all of which changes have tended to a lower cost and the elimination of certain machine parts. The first of these developments resulted in the so-called rotating frame type of drive which employs a slow-speed direct connected direct current motor on each section of the paper machine, with a synchronous motor geared to the main driving motor direct instead of through a pair of cone pulleys as was the case with the original type of drive. The elimination of the cone pulleys, belt and belt shifter made it necessary to obtain the adjustment of draw in some other way, and this has been accomplished in the new type of drive by rotating the stator frame of the synchronous motor. In order to do this, a 0.6 H.P.-250/750RPM-250 volt D. C. motor is used and connected to the stator frame through a 24:1 worm gear reduction. This permits of a maximum positive or negative speed of the stator frame of about 31 RPM when the motor is revolving at 900 RPM, giving a total possible change in speed for any one section of 3.5 per cent. The armature of the 0.6 HP motor is connected directly to the generator bus, which supplies power to the main driving motors, while the fields are excited from the exciter which permits of maintaining the relative speeds of the various sections when the speed of the machine is changed as a whole.

No provision whatever is made to tie-in the 0.66 HP motor, as any slight change in speed on these motors will not appreciably affect the speed of the main driving motor on the section. For instance, if a 5 per cent change in speed should occur on the 0.6 HP motors it could not affect the speed of the main driving motor more than a small fraction of 1 per cent. With this type of equipment each section has a rotating frame synchronous motor with its small D. C. motor, except the dryer sections, one of which has no synchronous motor whatever and the other of which has a synchronous motor without rotating frame. This dryer section is used as a master to control the remaining sections on the machine.

The synchronous motors as with the old type of drive are connected up to a dead bus; this connection being made on the last point of the control after the main driving motor is up to its full rated speed. The adjustment of draw is taken care of by means of a field rheostat in the small D. C. motor and this rheostat is located on the front side of the paper machine. The control for this type of drive may or may not be of the pedestal cabinet type as furnished on the first type drive, but it is now recommended that an enclosed contractor panel be located in the basement underneath the machine with a small master controller located on the front side of the machine. With each section there is furnished—

An auxiliary control panel containing:

D. C. ammeter
Zero center scale wattmeter
Synchronizing lamp

Record-Breaking Felts
for a
Record-Breaking Machine

WASHING AND FULLING ROOM, ALBANY FELT COMPANY

World's Largest Book Paper Machine Clothed with Albany Felts

FULLY realizing that the speed of their new 170 in. machine, and the finish of its products, must largely depend on securing felts of proper strength and texture, the P. H. Glatfelter Co. have relied on our company to meet their unprecedented requirements for the largest and fastest Book Paper Machine ever built.

SPECIFICATIONS

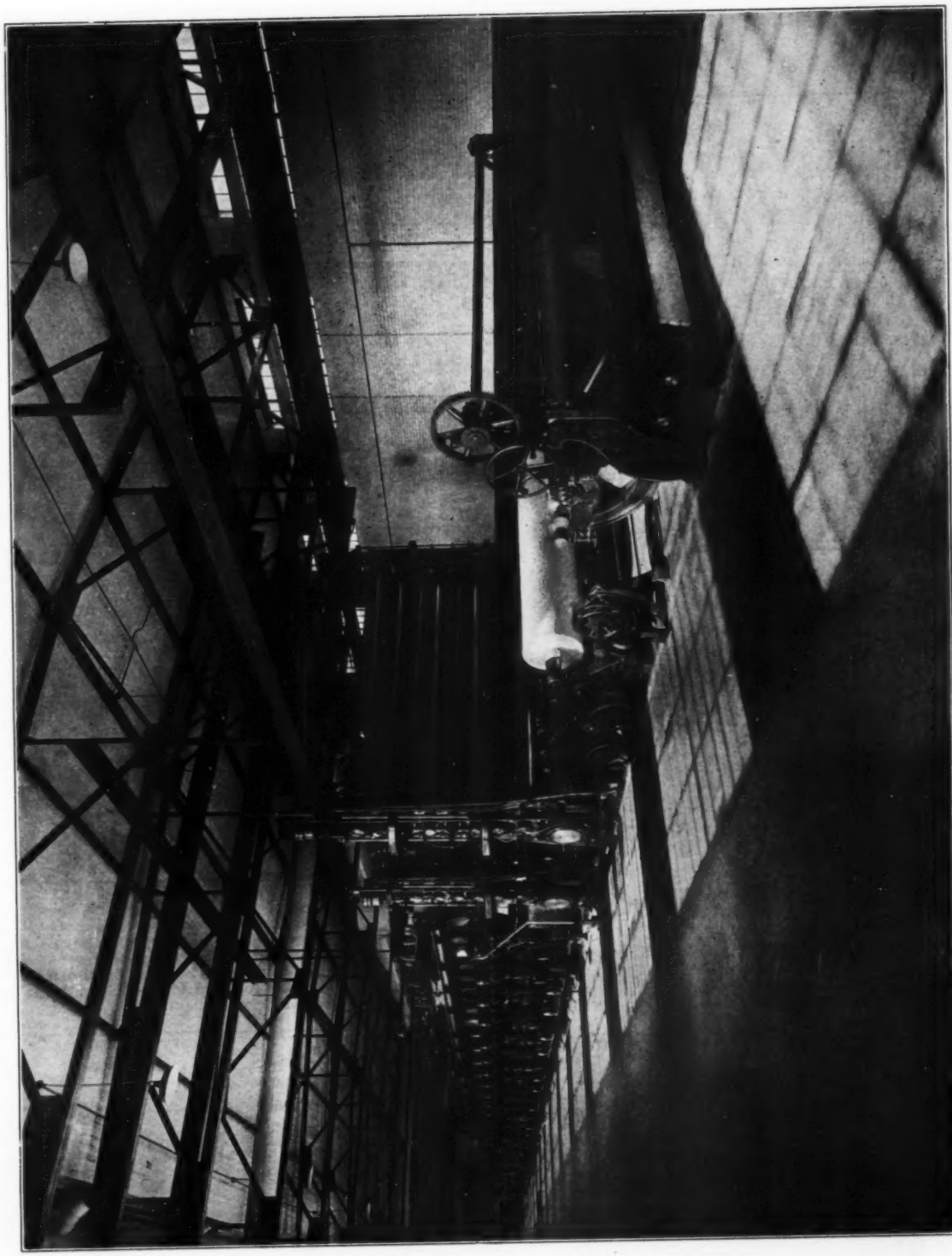
Felts must work satisfactorily at 600 ft. per min.

DIMENSIONS:

First Felt, 60x172
Second Felt, 60x172
Third Felt, 60x172

We are Prepared to Solve the Hardest Felt Problems

ALBANY FELT COMPANY
ALBANY, NEW YORK



Dry end of paper machine in new Glatfelter plant

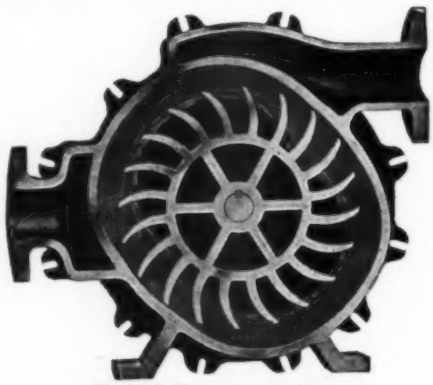
The "Ultimate" in Paper Machinery Specialties

SOLD BY

1718 Republic Bldg. **THOMAS H. SAVERY, Jr.** Chicago, Ill.

Surpassing All in Its Field Is the Nash Hytor Vacuum Pump It Is Unexcelled for Suction-Roll and Flat-Box Service

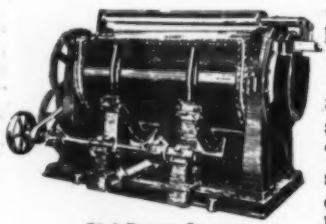
Highest efficiency
Greatest durability
Absolute Reliability
No expert attendance
No Valves, Pistons,
Rods, Crankshafts,
Loose Vanes or Gears



The Nash Hytor Vacuum Pump

Requires minimum power
Requires minimum maintenance
Requires minimum upkeep
Only one moving part, the rotor, which runs in casing with large clearance
Only three principal parts

The Bird Inward Flow Rotary Screen

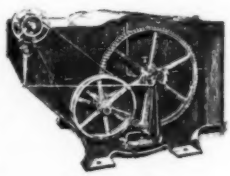


Bird Rotary Screen

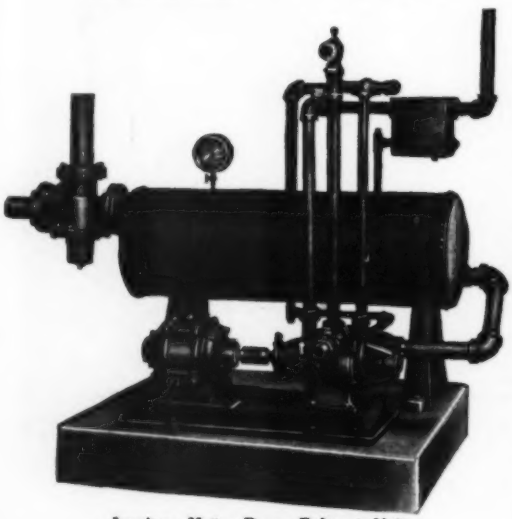
is now screening 75% of the newsprint paper screened. It is well designed and carefully balanced. No lumps, strings, slime spots. This screen also successfully used on almost every kind of pulp.

The Bird Save-All

now built in two sizes is in successful use in a number of mills. It is automatic in operation; recovered pulp pumped back to chest or system as desired by pump which we furnish; requires minimum power, space maintenance and upkeep.



Bird Save-All

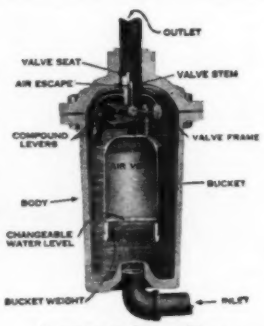


Jennings Hytor Dryer Exhaust Unit

THE HARLAND INTERLOCK ELECTRIC DRIVE, Marvel of the Age, is producing most extraordinary results wherever installed. All Canadian mills using this excellent equipment are delighted. Every drive sold in Canada in the past two years in connection with wide machines has been a "Harland." This drive is now being manufactured in the United States and prompt delivery can be made.

Improved Economical System for Handling Condensate from Dryers of Paper Machines a Success

This consists of an individual Armstrong Steam Trap on the return line from each dryer with the main return header connected directly with the Jennings Hytor Dryer Exhaust Unit, insuring circulation and highest efficiency of dryers.



Armstrong Steam Trap

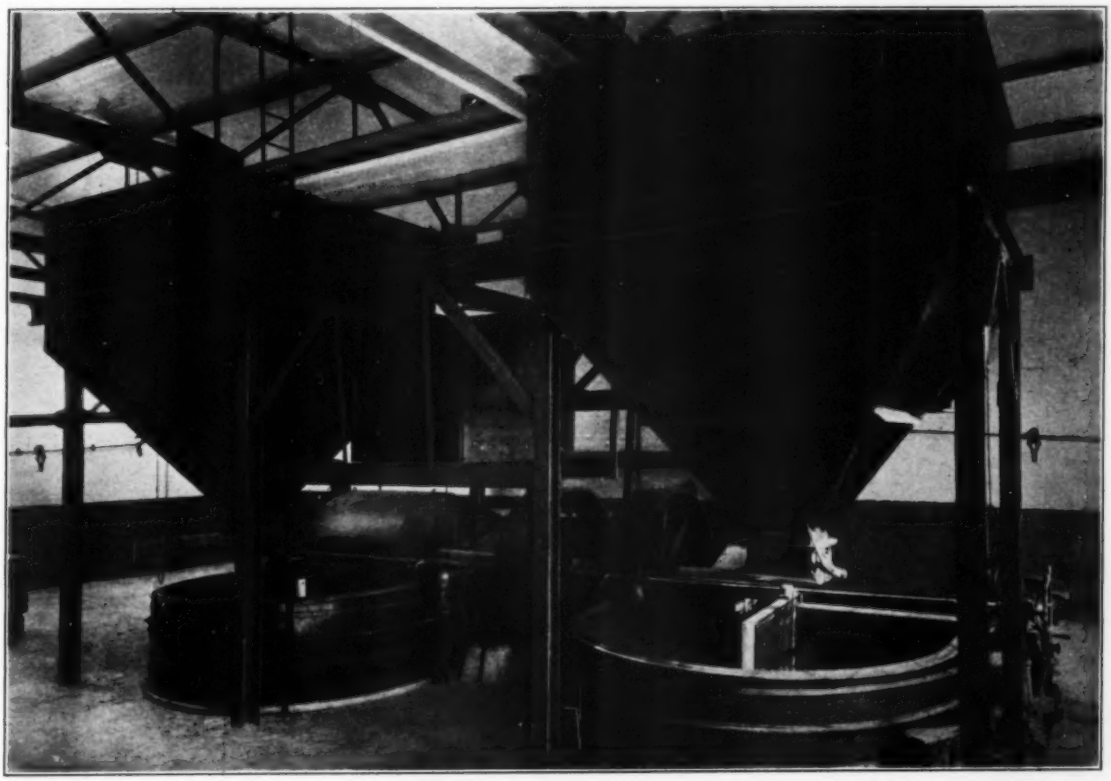
Push button, and
Rheostat for the main driving direct current motor.

This panel is also located on the front side of the machine, preferably on the wall.

The auxiliary control panel for controlling the speed of the entire machine as a unit consists of a rheostat hand wheel with chain operating mechanism, a push button for start and stop duty and a speed indicator graduated in feet per minute, while the motor generator panel consists of a line contractor, a single pole line switch, exciter field rheostat, overload relay and exciter armature switch. The motor generator panel is located in adjoining room with a generator which supplies power to the paper machine.

Two 2000-pound E. D. Jones & Son quick dumping beaters have been installed. This pair of beaters is driven by a 200-H. P. motor, through Lenix drives, each having a rated capacity of 100 H. P. By means of this drive system it is possible to operate two beaters, or more, from one motor, without interfering with the independent operation of either beater.

A novel method of feeding the beaters is used in the shape of a large tank over the top of the beaters.



One corner of the new beater room

Vapor Absorption System

In the machine room, which is of course the heart of the whole mill, there is one of the latest and most up-to-date Ross vapor absorption systems. This system is based on the principle that in order to carry the vapor from the room, a certain amount of air must be removed from this room. In the roof are installed two large exhaust fans for discharging this vapor and air to the atmosphere.

It is now well recognized that an equal amount of air must enter the machine room and that this air must be warmed either in the machine room or elsewhere. The old principle of allowing the air to leak in around doors and windows was recognized to cause trouble with condensation and also to make a cold room. To allow this air to come from other departments of the mill meant a drafty cold place and in this machine room the air is warmed by steam coils and discharged into the machine room by a large blower fan. Part of the air is discharged along the roof to keep the roof warm and free from drip. A large proportion of the air, however, is discharged through a series of nozzle pipes carried through the machine room at various points so that this warm air in addition to carrying off the vapor performs the duty of keeping the felts dry and bringing the heat around the machine where it will be of use in drying the paper.

The modern electric driven paper machines, like this one, require comparatively slow speed motors and these motors operate at such slow speeds that there is a tendency for them to overheat. In other words, the motors do not create a sufficient draft of air through the windings to keep them cool. To remedy this, it will be noticed that the various motors have an air connection and that cold air is blown through the motors to prevent their overheating. This air is supplied by a fan, which is directly connected to a motor, doing away with belts and chain drives. The same fan also supplies air for cooling the calender rolls, the air being carried up through pipes and arranged in such a manner that the cold jets of air can be directed to any part of the calender stack.

The filtering plant, installed in the new building for this purpose, was designed and installed by the Norwood Engineering Co., of Florence, Mass.

In the front part of the filter building, provision has been made for a complete chemical laboratory, consisting of an office, a general laboratory and a special laboratory for the testing of water and for microscopic work.

There is a great deal of routine work in a pulp and paper mill, in connection with the various chemical processes and their control. In addition to this work, a system of regular inspection and analysis of raw materials is carried out. Coal, clay, sulphite pulp, rosin, alum, lime and other materials are kept to a uniform standard only by frequent analysis.

Determination of fibre and ash content and a uniformity in moisture in the finished paped are other tasks which fall to the paper mill chemist. Special problems and questions involving research work are met with from day to day.

Among those firms that furnished equipment, other than that already mentioned, were the following:

Pumps for water—Frederick Steel & Iron Co., Frederick, Md.
Stock pumps—Black-Clawson Co., Hamilton, O.
Screens—Birds Machine Co., South Walpole, Mass.
Calender stack doctors—J. A. Frossard, Pepperell, Mass.
Reel and winder—Beloit Iron Works, Beloit, Wis.

HOOPERWOOD
Standard Dryer Felts

Maximum Production
for
Minimum Felt Cost

WM. E. HOOPER & SONS COMPANY
Juniper and Cherry Streets
PHILADELPHIA
Founded 1800 *Mills: Woodbury, Md.* *Incorporated 1907*

Millspaugh Suction Rolls Make Speeds of 1000 Feet per Minute and Above Possible

LAURENTIDE PAPER COMPANY have run successfully at over 1,100 feet per minute. Making width of two rolls, they produced over 90 tons of newsprint in one day.

SUCTION COUCH AND PRESS ROLLS are recognized standard parts of modern paper machines.

They increase production, improve quality, save wires and felts, reduce labor costs and save steam.

Old machines may be made modern.

Send for catalogue or request a call from one of our field engineers who will help solve your problems without obligation on your part.

We Also Manufacture

Fluid compressed bronze, brass, nickel alloy, copper and aluminum tubing.
Roll covers, press rolls, wire and felt rolls, shower pipes and spray nozzles.
Ford automatic vacuum felt and wire guides.
Wilder news roll headers.
Sandusky anti-friction bearings and
Crandall drives for all parts of paper machines.

THE SANDUSKY FOUNDRY & MACHINE COMPANY
SANDUSKY, OHIO

Press and wet felts—Albany Felt Co., Albany, N. Y.
Dryer felts—Wm. W. Hooper & Sons Co., Philadelphia, Pa.
Wires—Eastwood Wire Mfg. Co., Belleville, N. J., and Buchanan & Bolt Co., Holyoke, Mass.
Rubber covered rolls and rubber hose—United States Rubber Co., New York City.
Belting for machine—J. S. Latta & Co., Philadelphia, Pa.
Electric drive for machine and beaters—General Electric Co., Schenectady, N. Y. Also furnished the motors.
Lubricants—Gulf Refining Co., Pittsburgh, Pa.
Jordans—E. D. Jones & Sons Co., Pittsfield, Mass.
Leather Belting—Himmelein & Bailey, Philadelphia, Pa.

Hummel-Ross Fibre Corporation Plant

THE Hummel-Ross Fibre Corp. have under construction, and partially in operation, an interesting mill located at Hopewell, Virginia. The plant is designed for a capacity of 100 tons per day of kraft pulp and paper, but the first installation will produce only half that quantity of paper. Fifty tons of strong pulp per day are now being produced and marketed, and it is expected that during May of this year, part of this tonnage will be converted int o paper in the paper mill now approaching completion, and soon after that period the pulp production will be increased to 100 tons per day, the surplus of which will be marketed.

The pulp mill was laid out on broad lines, with a power plant capable of taking on the additional load incident to the increasing capacity, and the whole plant has been carried out in a way that reflects credit on the enterprise, that bids fair to become as important a factor in the sulphate paper field, as is the Hummel & Downing Company's property at Milwaukee, Wisconsin.

Mr. J. P. Hummel, formerly the head of the Milwaukee concern, is president of the new organization, which is an assurance that it will be a strong factor when the development plans are carried to maturity. For several years Mr. Hummel has been looking to the South for a field of endeavor, and the combination of a plentiful wood supply, water transportation to New York and other Atlantic Coast points, and healthful climate and beautiful situation, convinced him that the cellulose plant of the DuPont Company (a war by-product), and the enormous lakes of nitre cake left in its wake were added inducements to locate at Hopewell, Va.

The Hummel-Ross Fibre Corp. have employed Joseph H. Wallace & Company of New York as its Engineers, and an examination of the plans of development, and the work already completed, will be of interest to paper makers who have an opportunity to visit the plant.

Approaching, as one does, from City Point,—historically of interest as General Grant's base in the Civil War campaign of the Wilderness,—the office, as first reached, is attractively located, overlooking the James River from the high plateau on which the plant is located.

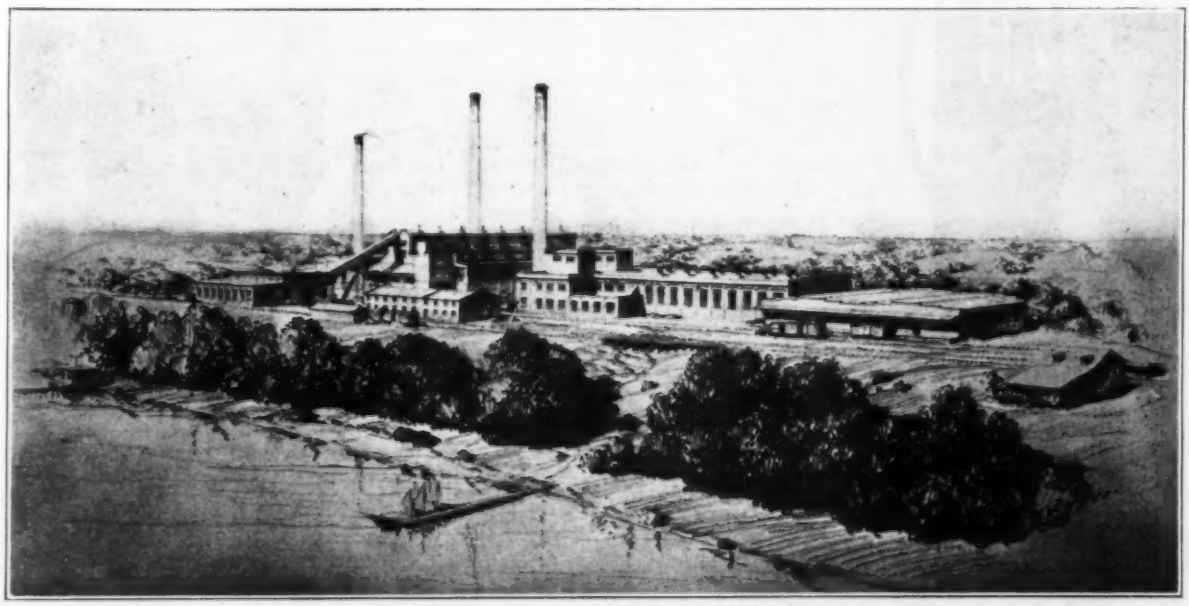
The Paper Mill

The paper mill is beyond, on the right. This is designed for the production of 100 tons per day of Kraft wrapping paper. It is now equipped for half of this production, while provision is made for the installation of a second machine and the extension of the finishing building in two directions,—practically duplicating the present arrangement symmetrically along the longitudinal axis of the buildings. The building, exclusive of the finishing room, is 343 ft. in length, and will eventually be 135 ft. wide at the wet end. It is now constructed 87 ft. wide, with temporary siding the full length, providing for the future installation. Ninety ft. of this length is a two story section, having in addition a monitor story 18 x 55 ft. in area.

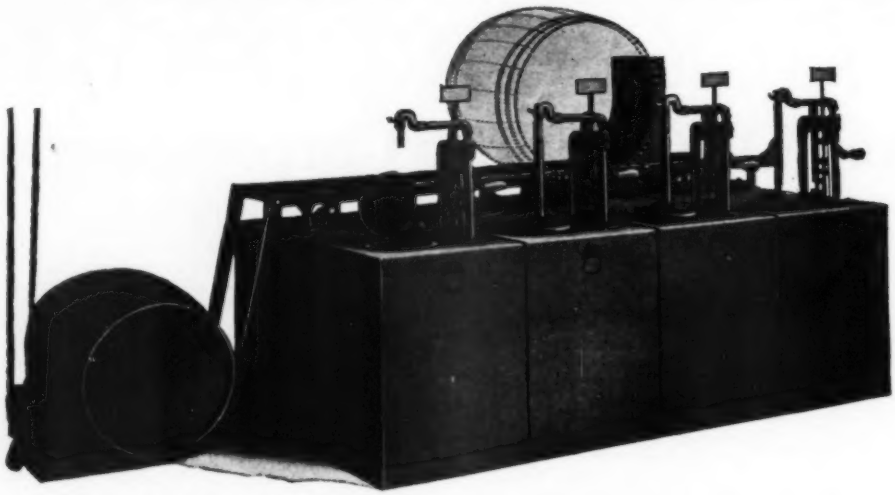
Slushed pulp is delivered to two 8′ Green Bay thickeners in this monitor story, from pumps in the Digester Building; the white water flowing back to the new save-all house by the Digester Building. The stock falls by gravity to a 16 ft. agitator tank immediately beneath the thickeners and above the beater floor, from which it is delivered as required at the proper consistency to the beaters on the floor below. Four 67″ x 60″ roll, best type high speed Jones beaters are suitably arranged about this tank and individually driven by belts from 125 HP motors on the basement floor, below. On the beater room floor are also four large size Horne Jordans, and the superintendent's office. These Jordans are direct-connected to 250 HP synchronous motors, and so connected by their flow boxes and piping that any combination in series or parallel may be employed. This arrangement permits of maximum modification of the stock to meet requirements.

On the floor below the beater room, at an elevation approximately ground level, are four 12′ diameter x 24′ horizontal wood-stave stuff chests with agitators, and also the necessary tanks and equipment for sizing material. The four beaters are spouted to two of these chests, from which the pumps deliver to the Jordans; and from thence the flow is to the other two stuff chests, from which it is pumped to the screens.

The basement floor under the beater room, not covered by the stuff chests, is extended beyond the 90 ft. length of the beater building for 72 ft. additional. On this floor are located the stuff pumps, couch save-all, blower fan, paper mill engine, and other pumps and necessary accessories of the paper machine. The machine floor, under which there is no basement, is 6 ft. above this floor, and open across this section to the engine room. The machine room proper is 252 ft.

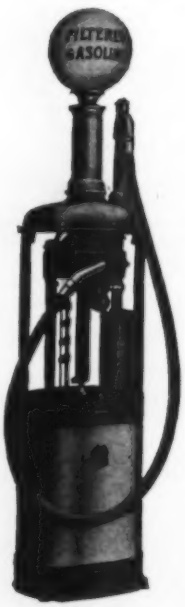


Perspective of the new Hummel-Ross plant



Cut 12. First Floor Battery Outfit with single acting, quart measuring pumps

American Lubricating Oil Storage Systems



Cut 104
Curb or Roadway Gasoline Pump

For serving gasoline to your trucks. Furnished with underground storage tank. Bears the Underwriters' label and protects from fire, explosion, spilling, leaking and evaporation, and enables you to buy gasoline in quantity at LOWER price.

Ask For Bulletin No. 5

CUT OUT THIS TAX!

Do you realize that serving oil from barrels is equivalent to a *fifty per cent tax* on your oil supply?

Why pay this *exorbitant* tax?

You can save it by installing an American Oil Storage System, because—

With this storage system you can buy oil in quantity at *a lower price*—you can get a *lower rate of insurance*—you can *save* a surprisingly *large amount* of oil now wasted through leakage and spillage.

And, most of all the American Oil Storage System will *save the valuable time* of both men and machines and give you *cleaner, better oil.*

Figure up these items of saving and you will find our estimate of a fifty per cent tax a *low* one. Then take your year's purchases of oil and let us tell you *how long* it will take *to pay for* an American Storage System *with the savings* you will make.

Write for Bulletin No. 203—and learn the *saving way* to handle oil with an American system adapted to your special needs.

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Pump with Meter Attached

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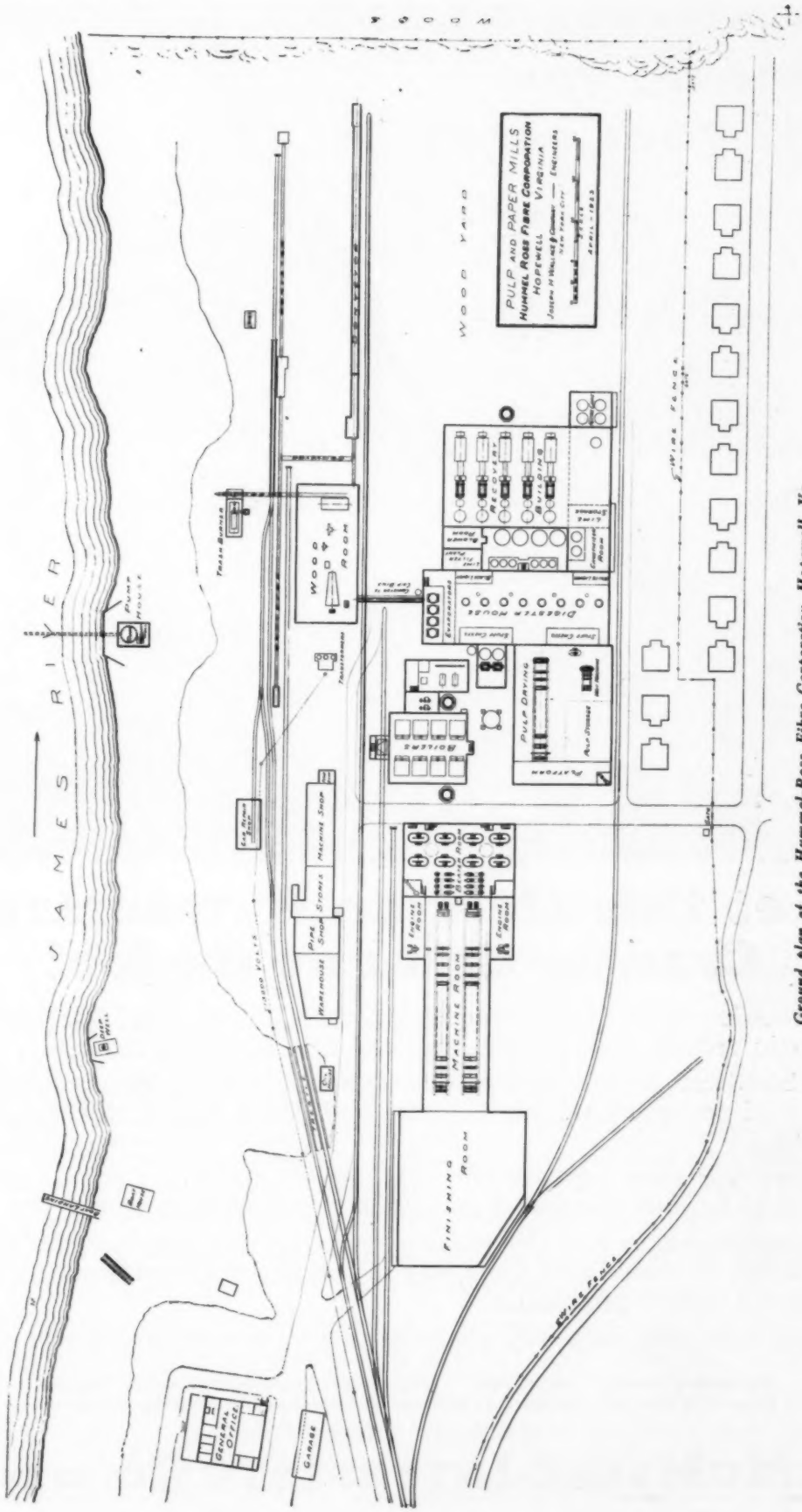
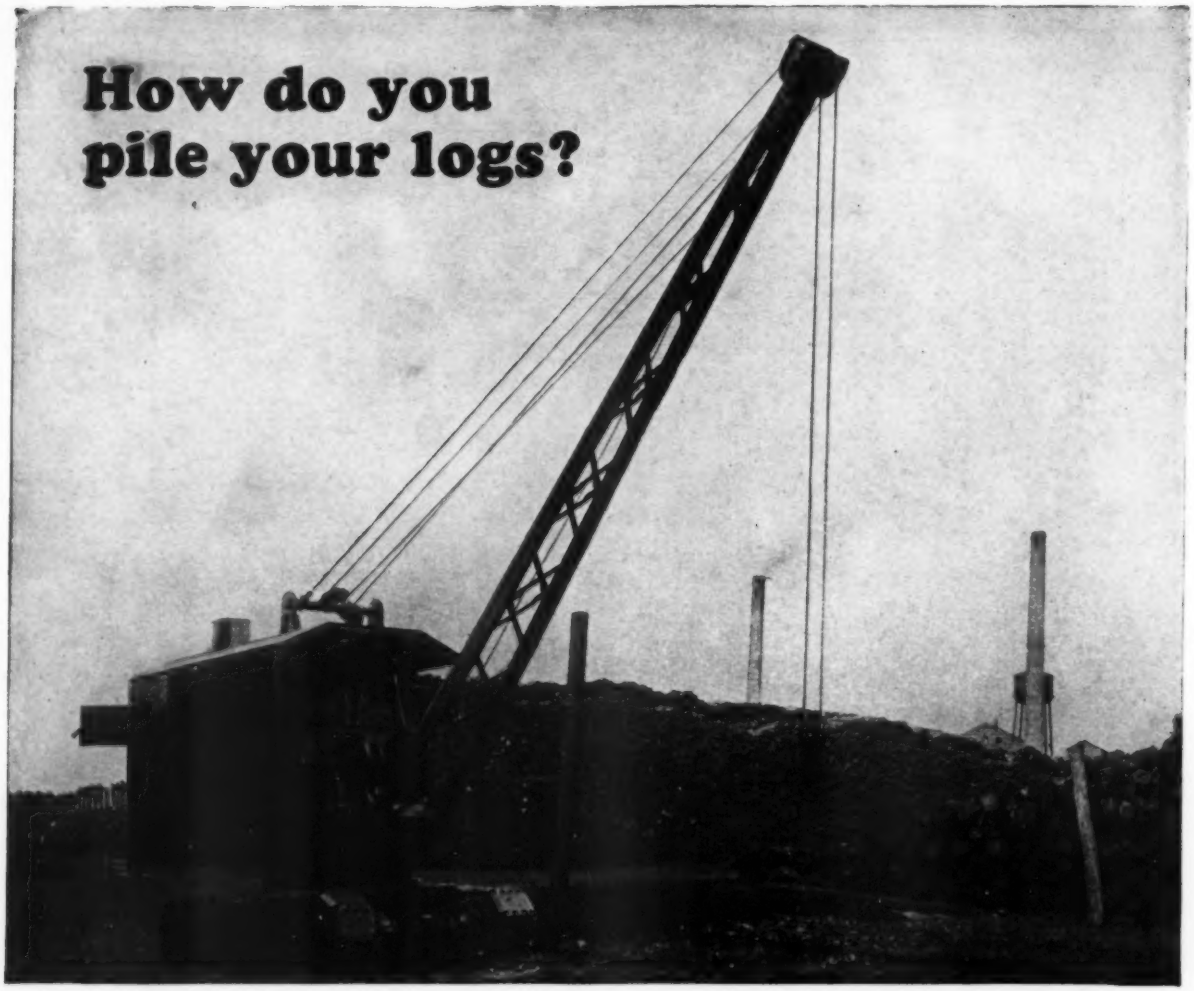
Ask For Bulletin No. 44

Quotations Furnished on Special Oil Tanks for Holding Any Quantity From 100 Gallons to Car Load



Ground plan of the Hummel-Ross Fibre Corporation, Hopewell, Va.



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Here's a mobile crane of 10 tons capacity that will unload your logs from the cars, pile them in orderly storage rows and deliver them from storage to the mill.

With its broad crawler treads, it travels without hesitating over railroad tracks, through sand and mud, up steep grades and down. And it will carry its load with it, too.

Besides handling your logs this No. 2 McMyler-Interstate Crawler Crane will unload coal or do your excavating and assist in construction work.

Construction that is sturdy and generous in every detail makes this crane one that will stand up under hard work, day in and day out, permitting its operator to give his full time to production.

May we tell you more fully why you need this crane in your plant?

Locomotive Cranes · Car Dumpers · Coal and Ore Handling Machinery · Forgings
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long and 50 ft. wide as built, with provision for extending the clear span roof trusses and the traveling crane for a width of 78 ft. providing for the second machine, with ample space between.

The machine is a Downingtown Fourdrinier, trimming 120". It is equipped with two P. A. P. A. Spangenburg screens, 25" suction couch roll, one suction press, and two ordinary presses with top rolls of stone, 38 48" x 130" driers, four felt and one lead drier, one stack of calenders, English type reel and Warren winder.

Farnsworth system of return condensation is employed, apparatus being in two pits at rear of machine; all condensation from this and the engine room returning overhead to the feed water heater in the power building.

The machine room is spanned by a 10 ton traveling bridge crane, and provision is made for handling product through large doors to the finishing room by a light crane at end of the machine. There is a clear head room under trusses of 24 ft. and 19' 6" under the crane. The hood is of asbestos mill board, being framed in the truss. Five 5' ventilators pass through the roof from the hood. The ducts of the fan ventilating system pass through the trusses and distribute outside the hood under the roof, which is of gypsum slab. The room is well lighted by large fixed Fenestra sash, and every consideration for a clean, free operation of the machine is provided.

There is a 6' x 8' electric elevator at the end of the passage communicating with the beater room and the ground level floor of the basement under. Stairways of easy access connect the engine room floor and beater room with the machine floor.

These buildings are of brick and structural steel, with concrete sub-base, all of attractive exterior appearance, and completely painted inside in white.

The finishing room, at the end of the machine room, is of brick and timber construction, 90 ft. x 125 ft. wide, with temporary end wall and temporary side for future extension in two directions. There is a loading platform along the side where the spur track runs the entire length of the paper mill. This room is of 16 ft. head room, and well lighted. The machinery in this room consists of a Hamblett Duplex cutter with Erie layboy, a Cameron rewinder, and a Seybold trimmer. Additional equipment will be installed as the trade demands require.

The building is not only for paper storage, and as a shipping room; but will house the machinery for rewinding sheet cutting and manufacture of counter rolls, automobile tire wrapping, gummed tape, etc.

While the paper mill represents entirely new construction, alterations in the pulp mill section have resulted in economies and increased production that have been most gratifying.

The Power Plant

The boiler house, just beyond and in line with the paper mill, is equipped with four 600 HP Edgemoor boilers, and complete coal handling equipment. By replacing unsatisfactory stoker equipment with Riley extra long retort stokers and suitable fan equipment, and rearranging the baffle construction in the boilers, they are now being run at 200% of rating, while 300% was readily obtained on peak demand. This enables the 100 ton pulp mill to operate on two units, while the 50 ton paper mill on the third leaves a spare boiler.

The power plant, adjacent to the boiler house, contains one 750 Kw. non-condensing turbine, the exhaust of which is used on the pulp-drying machine and the multiple-effect evaporators of the liquor recovery. In addition there is a 600 Kw. Allis-Chalmers condensing turbine and the usual power plant accessories,—fuel water heater, boiler feed pumps, etc. On the turbine floor is the switchboard recently added for the paper mill equipment.

It is the intention of the company to purchase a part of their electrical power from the Virginia Railway & Power Company, whose lines extend into the company property. This is provided for by an outside sub-station with transformer capacity of 3,000 K V A, the secondary current being distributed from the regular switchboard.

The Pulp Mill Section

The digester building, beyond the power house, has two units of four digesters, each 8 feet by 25 feet. These digesters were from the DuPont Hopewell units for cotton purification. By fitting them with suitable false bottoms and installing external Morterud heaters for circulating liquor, the output per cook was increased over 25 per cent,—although partially due to improvements in the chip size and better charging. Production is now over 50 tons per day on a single unit of four. This pulp is run on a Downingtown machine in adjacent building and marketed 85 per cent dry. The second unit of four digesters will supply the paper machine.

The water supply is from two wells, the James River and City mains. The pump house is located at the foot of the bank on the river shore. The recent installation of tanks and save-alls has effected a saving of over 50 per cent of water by re-use and the return of over three tons of pulp per day formerly passing to waste with the water. The use of city water has been almost entirely eliminated.

At the end of the digester building is the evaporator room with four Zaremba evaporators, used in triple effect, and on a gallery alongside digesters are twelve settling tanks for causticized liquor.

The recovery house, beyond the digester building, contains four units each of smelters, rotary incinerators and disc evaporators with dissolving tank. An interesting feature of the process here is the addition of salt cake in solution to the black liquor before evaporation, instead of as solid in the smelters. The DuPont manufacture of explosives here left a war accumulation of nitre cake in two large deposits or lakes, as they are termed. This was an attractive feature in locating this plant here, representing as it does a supply of salt cake for an indefinite future.

The leached solution from this deposit is pumped to the chemical house, where the excess acid is neutralized by soda ash; it is then in suitable condition to be added to the black liquor as sodium sulphate in solution; when the smelters are reached, conversion takes place the same as if added dry at this point.

At the rear of the recovery house are two liquor causticizing tanks, the settling tanks being in the digester house, as mentioned. The intended installation of sludge filters will effect a saving and convenience at this point.

The wood room is located at the top of the river bank, immediately opposite the digester building. The wood,—short leaf southern pine,—is delivered by rail. The company owns adequate supplies of standing timber for the future operation of this mill, but are now purchasing in the market. The wood is conveyed from piles beyond the wood room to dry drum barker, and fed to an 88-inch Carthage chipper and to a 48-inch chipper for small stock. By suitable conveyors, screens and Lombard crusher, these chips are delivered to the digester bins in a uniform size that has materially helped in obtaining the increased output per digester. Alongside the paper mill are the machine shop, pipe shop and stores buildings.

The plant is conveniently traversed by standard gauge track, and is connected by narrow gauge track to the City Point Wharf, permitting receipt of raw material and shipment of product, by water as well as rail, making especially accessible the important Atlantic ports.

The buildings of this plant are of unusually substantial construction, of steel, concrete and brick, conveniently arranged along graded roadways and maintained in excellent condition. The property is fully protected by a system of water mains, hydrants and hose stations and pump in the pump station, as well as city water and sprinkler equipment in the buildings.

The company has many cottages, acquired with the property, which are piped with city water and sewered, and are of substantial frame construction.

This plant is sure to be an important factor in the growing sulphate field.

New Composition Discovered

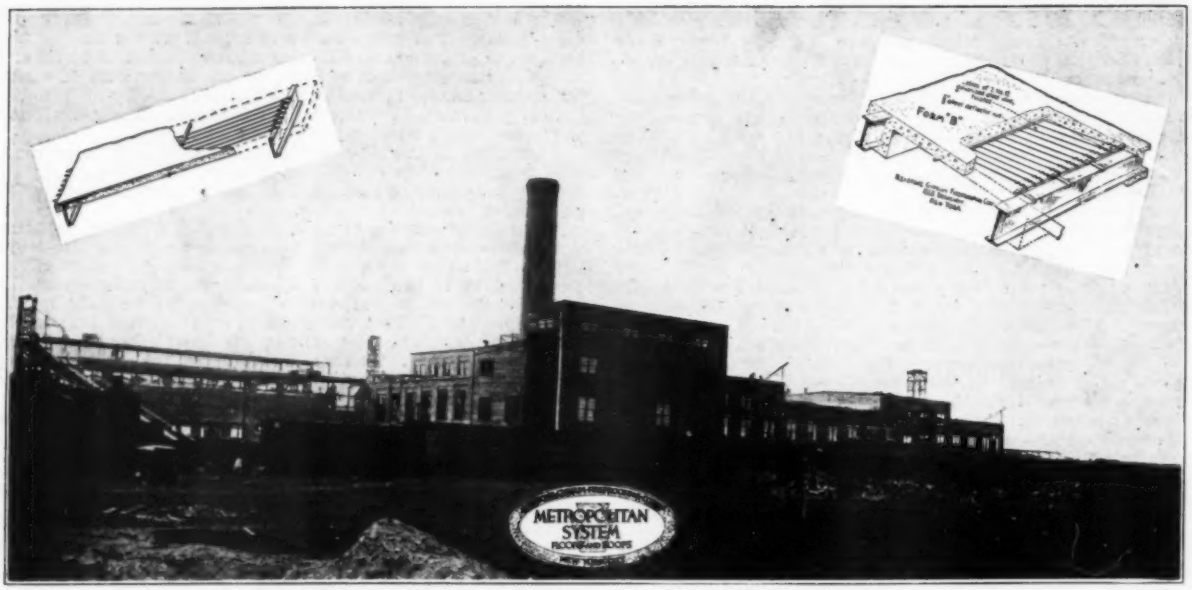
A new product known as Cellulin will soon be manufactured by the Cellulin Corporation, with general offices at 835 Caswell Block, Milwaukee, Wisconsin.

Cellulin is the trade name of a perfectly transparent cellulose sheeting. This material is a compromise between tissue paper and glass, it being as thin and flexible as tissue paper and as transparent as glass. No other article now on the market can in any way compare with it. Tests made of the tensile strength and other physical characteristics of Cellulin indicate it to be in a class by itself.

Plans are now in process of formation to erect a factory at Milwaukee to manufacture Cellulin in large quantities.

Many have tried to make a similar material but without success, and years of experimentation were required to perfect this product. Patents and secret processes give the owners a monopoly on this class of paper. It will be manufactured in various thicknesses, the lightest being one thousandth of an inch. It will be marketed wound in rolls so that consumers can cut it in any length desired.

Cellulin is not affected by acid, alkali or oxidizing agents of ordinary concentrations. It does not burn as readily as paper and the heavier grades are admirably adaptable for moving picture films and are not inflammable. It is soft and resembles silk in appearance. A process has recently been perfected which permits of the highest grade of printing and lithographing being done on this product.



Preventing Condensation in Paper Mills

The high insulating value of METROPOLITAN COMPOSITION prevents condensation and ceiling drip in spite of the moisture arising from these expensive paper mills in the heated machine room, engine room, finishing room, shipping room, screen room, grinder room, boiler house, transformer house and sub-station building of the St. Lawrence Paper Co., Three Rivers, Que., Canada.

Other Installations

Jigger Dye House and Silk Dyeing Room, Sunbury Converting Works, Sunbury, Pa.

Silk Mill, Madison Textile Co., Lock Haven, Pa.

Silk Mill, American Cellulose and Chemical Co., Cumberland, Md.

New Bleachery, J. and P. Coates, Inc., Pawtucket, R. I.

Extension to Beater Room, Chester Paper Co., Chester, Pa.

Machine Room Extension, Machine Room Pent House, Ground Wood Screen Room, Two Wet Machine Rooms, Grinder, Motor and Switch Board Room, St. Maurice Pulp and Paper Co., Cape Magdelene, Que., Canada.

Machine Room Building, Strathmore Paper Co., Woronoco, Mass. Samuel M. Green Co., Engineers, Springfield, Mass.

Machine Room No. 12, and Beater Room, Chester Paper Co., Chester, Pa., Geo. F. Hardy Co., Engineers, 309 Broadway, New York City.

Machine Room Buildings, Etc., Crocker-Burbank Co., Fitchburg, Mass., Geo. F. Hardy Co., Engineers, 309 Broadway, New York City.

Machine Room Buildings, and other rooms, P. H. Glatfelter Co., Spring Grove, Pa., Geo. F. Hardy Co., Engineers, 309 Broadway, New York City.

Machine Room Buildings, Power House, Transformer House, Digester Bldg., Wayagamack Pulp and Paper Co., Three Rivers, Que., Messrs. T. Pringle and Sons Ltd., Montreal, Que., Canada, Contractors.

Machine Room, Fitchburg Paper Co., West Fitchburg, Mass., Geo. F. Hardy Co., Engineers, 309 Broadway, New York City.

Machine Room, Two Beater Rooms, Generator Room, and Boiler Room, Fitzdale Paper Co., Fitzdale, Vt.

Machine Room, Engine Room, Transformer House, Wrapper Machine Room and Motor Room, Abitibi Power and Paper Co., Iroquois Falls, Ont., Geo. F. Hardy Co., Engineers, 309 Broadway, New York City.

Machine Room, Finishing Room, Beater Room, Engine Room, Boiler Room and Transformer House, Keickhefer Container Co., Delair, N. J.

Buildings, Price Bros. Co., Kenogomi and Jonquiere, Canada.

Duplan Silk Plant, Nanticoke, Pa.

Gas Blowing Engine Building, Bethlehem Steel Co., Steelton, Pa.

Wabasso Cotton Mill, Three Rivers, Que., Canada.

Dry Kiln Building, Victor Talking Machine Co., Camden, N. J.

Sulphate Building, Bethlehem Steel Co., Bethlehem, Pa.

Griswold Worsted Mills, Darby, Pa.

Machine Room No. 4, Schmidt and Ault Paper Co., York, Pa.

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another central organization within six months, and that because you are facing more drastic control by the federal and state governments, radical legislation of all kinds, and a competition from foreign countries which must force unified action.

Your secretary is keenly appreciative of the opportunity afforded him of working another year with President Raybold. Few members of the Association appreciate the time and thought demanded of the President. He has met all of the demands from the Association in a kindly, generous spirit that has meant very much to those of us who are carrying the work of your Association here in New York.

The spirit of friendliness and support extended your secretary by members of the Executive Committee, the secretaries of affiliated associations, and his associates in the Association, has meant everything in carrying on the work as you want it carried on. The Association after all, like any organization of men, is what the members make it. Your officers can but assist, and to repeat the closing sentence of the report of last year, "how much that assistance will mean to the Association will depend entirely upon the way in which you meet, not only the Secretary, but your President, and your Executive Committee, in the work which they are trying to do for you."

Reports of Committees

The reports of the various standing committees were then submitted. Henry W. Stokes, chairman of the Tariff Committee, read his report, which follows:

REPORT OF THE TARIFF COMMITTEE

By Henry W. Stokes, Chairman

The Tariff Committee of the American Paper and Pulp Association has completed the work for which it was originally called to perform. The Tariff Act of 1922, after much delay, was finally passed by Congress and approved by the President.

In the preparation of the paper schedules your Committee, aided by other manufacturers, took an active part and believe that while there may be some dissatisfaction on the part of some manufacturers, the schedules as finally embodied in the law are reasonably fair and satisfactory, and provide a more adequate protection to the industry than was afforded by the previous law.

With business conditions in Europe returning to a more settled basis, the apparent advantage enjoyed by the foreign manufacturer will continue to disappear and coincident with that the American manufacturer should receive a corresponding benefit.

Value of Customs Expert

The Secretary of the Association has emphasized a number of times the advantage to the industry of having in the Association a man who might be called a customs expert. This man, who should know paper thoroughly and be fairly familiar with import and export problems, could keep in close touch with the larger ports of entry to see that paper is not being brought in and wrongly classified and undervalued. The Secretary is correct in his feeling that whenever paper is brought in from the outside and entered under wrong classification and undervalued that it injures the entire industry. It would be very difficult to estimate the amount of paper brought into the country in any one year which is both wrongly classified and undervalued. You were doubtless familiar with the efforts of the Government to secure from importers a number of thousand dollars additional fees upon paper which the Government is now convinced was undervalued.

Such a customs expert as described by the Secretary could not only be very helpful to the members of the various associations by protecting them against foreign papers wrongly classified and undervalued, but it would be comparatively easy for this same man to keep in very close touch with the importation of pulp into the country. Such contact with the pulp situation would allow the Association to give accurate figures on total amounts of pulp of different grades being brought in from week to week, or month to month, and it should be possible for such a man to secure accurate figures as to the amount of pulp held in storage at the different ports. There is no question as to the value of such information to the members of this Association.

Your Committee has not gone into this matter thoroughly and, of course, has no recommendation to make. We are quite sure, however, that the Secretary has investigated the matter carefully and we urge that he follow up this development and be prepared to lay a definite suggestion before the

"UNIVERSAL"
PAPER PULPERS

SIZE 17, TYPE VII, CLASS BB, "UNIVERSAL" PAPER PULPER

"Universal" Paper Pulpers are built in sizes of 50 to 290 gallons working capacity. They will rapidly and thoroughly break down wood and sulphite pulp preparatory to treatment in the beaters, as well as "broken" for either the beaters or storage.

Advantages and Economies:

(a) Separates the fibre without breaking it, thus producing better paper and more of it.

(b) Requires much less water than a beater.

(c) Dissolves paper rapidly and greatly reduces the time required for subsequent treatment in beater.

(d) Permits storage of "broken" pulp in wet state thus obviating fire hazard and economizing storage space.

(e) Permits working different colors successively in same machine, because of ease and rapidity of cleaning.

JOSEPH BAKER SONS & PERKINS CO., Inc.

SOLE SALES AGENT

NEW YORK 25 West 43rd St. CHICAGO 732 Conway Building SAN FRANCISCO 364 Pacific Bldg.

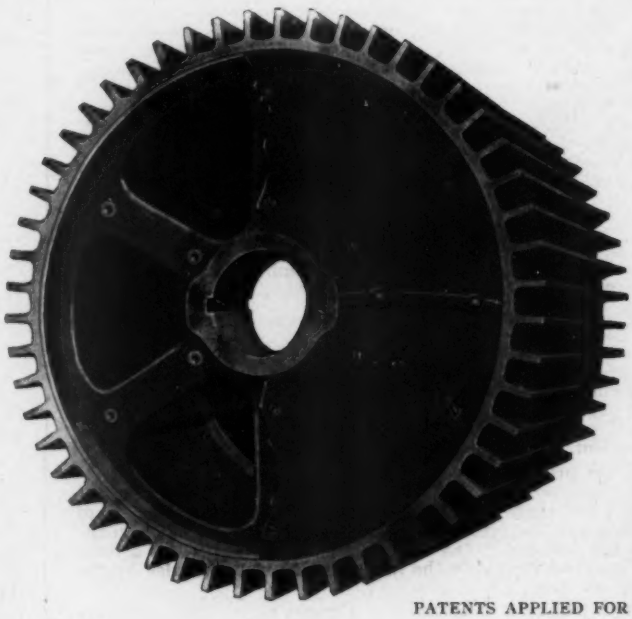
Executive Offices: White Plains, N. Y.

Factory: Baker-Perkins Mfg. Corp., Saginaw, Mich.

TRADE TISCO MARK REGISTERED IN U. S. PAT. OFFICE MANGANESE STEEL

ONE PIECE BEATER ROLL

No Separate Fly Bars
No Mechanical Holding Devices
No Wood Filling



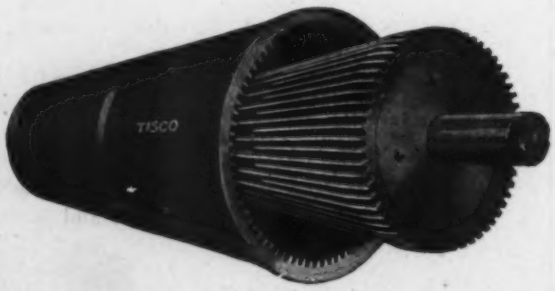
PATENTS APPLIED FOR

BLADES—

Cannot become loose—because they are an integral part of the roll.

They do not break—because Tisco Manganese Steel is tough.

They wear a long time—because Tisco Manganese Steel resists abrasion better than any known metal.



TISCO MANGANESE STEEL Jordan Fillings are cast in one piece—no separate fly bars to tear out and no wood filling to swell and cause trouble. Our plugs can be run at much higher speeds than would be possible with other types.

All beater rolls and Jordan fillings are machine ground true to size before shipment and are ready to install and operate without grinding in at the mill.

MADE TO FIT ANY JORDAN—ECONOMY GUARANTEED

Founded in 1742

Taylor Wharton Iron & Steel Co., High Bridge, N. J.

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720 Widener Bldg., Philadelphia
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201 Devonshire St., Boston

tive Committee of this Association. If the industry is being injured by the bringing in of paper, wrongly classified and undervalued, or by a lack of knowledge as to the foreign pulp situation, then it is entirely in place for American Paper and Pulp Association to present the need and to keep presenting it until action is taken that will allow the Association to give the service which it should give in keeping the membership informed and in protecting them from activities that make it more difficult to do business.

Expert for Tariff Commission

Your Committee in co-operation with the Committee of the Association on the Department of Commerce has urged through the Secretary of the Association that the Tariff Commission of the United States should employ a man who understands paper thoroughly to handle their paper activities. At the present time paper is grouped with lumber in the Tariff Commission. The industry was misrepresented enough during the war when a similar grouping took place and we believe that the Secretary should follow this matter aggressively to see if in time the Tariff Commission will not put on a paper expert to handle paper matters. After all, this representation of an industry in such an organization as the Tariff Commission, depends largely upon the interest and the work of the industry itself. We feel that the paper industry has been misrepresented enough in Washington and we recommend every effort which the Association can make in clearing up this misrepresentation so that the industry may be known there for its accomplishments and for what it can do in serving the public and the Government as a fundamental industry.

As the purposes for which your Committee was formed have been accomplished, and as there appears to be no reason for its continuance, we suggest that the present Committee be formally discharged to be reformed in the future should the necessity arise.

Following the adoption of the Tariff Committee's report, Chairman Stokes aked that a motion be made that the Tariff Committee be discharged until such time as it was deemed necessary for it to be reorganized, which was done and the motion was adopted.

George W. Sisson, Jr., chairman of the Forestry Committee and a former president of the association, submitted the following report for his committee:

REPORT OF FORESTRY COMMITTEE

By George W. Sisson, Jr., Chairman

Our Association would be remiss in its duty to the industry, and indeed to the public interest, did it not give serious and studious attention to the problem of a dependable raw material supply to perpetuate the paper industry in the United States.

Wood fibres of many species are now utilized and, by new process and adaptations, we are gradually widening the opportunities for their practical use. There is much to be done in this direction and it will prove of distinct help in our raw material problem.

The pulpwood supply of the United States is strictly limited, particularly as to that available for the mills in the East. Already we import from Canada about one-sixth of our pulpwood requirements and at least one-fifth of our woodpulp. Relatively few of our pulp and paper companies are independent as to their pulpwood supply. Many of them are purchasing more and more extensive timber holdings both in the United States and Canada.

In view of our own situation, conditions in Canada as to the growth of the industry there and its relation to Canadian pulpwood resources, hold great interest for us. As late as 1910, the total Canadian production of paper of all kinds did not exceed one-quarter of a million tons while in 1920 it reached nearly one and one-quarter million tons. The increase in production of newsprint in Canada has been especially startling. As recently as 1915 Canada produced less than half a million tons of newsprint while in 1922 her production was well over one million tons, of which, by the way, 82 per cent found a market in the United States. The most natural result of this great increase in consumption of pulpwood in Canada has been a growing concern on her part as to her own future in raw material supply for the industry. This resulted first in prohibition of export of Crownland wood and latterly in suggestion of an embargo or prohibition of export of freehold wood also. I cannot believe that the latter suggestion is seriously entertained by men of large affairs in Canada, as it appears to be carrying to an unreasonable extreme the idea of locking up National Resources against neighbors upon whom they are as surely dependent for favorable markets as are those neighbors for the wood.

MITTS & MERRILL

Conveyor or Gravity Feed Shredder

THE operation of a beater, with its wear and tear and tremendous power consumption, has one primary purpose, namely, hydration. Anything that will economically bring about hydration more quickly relieves the beater just that much, cuts down on operating costs and speeds the process of paper making.

The Mitts & Merrill Shredder performs on magazines, books, old paper and boxboard, frozen or dried pulp laps, roll and sheet stock, in such a way as to greatly reduce their resistance to hydration when they reach the beater. It gives the beater an economical lift.

Our Shredders are built in sizes with spouts ranging from 18" to 45" wide. We will be glad to quote you on any size adapted to your requirements.

We also build a 100% efficient "Hog" to reduce pulp mill bark and wood refuse.

MITTS & MERRILL

1013 Tilden Street, Saginaw, Mich.

Made in U. S. A.

WE BEG TO ANNOUNCE THAT ARRANGEMENTS HAVE BEEN COMPLETED TO MANUFACTURE THE

HARLAND "INTERLOCK" SECTIONAL ELECTRIC DRIVE in the UNITED STATES

Orders Booked in 1923

In U. S. A.: Messrs. Bogalusa Paper Company, Louisiana
One Drive—for 168 inch 200/800 F. P. M. Kraft Machine

In Canada: Messrs. Price Bros., Ltd., Quebec
Two Drives—for 234 inch 1000 F. P. M. Newsprint Machines

Messrs. The Belgo Paper Company, Shawinigan Falls
One Drive—for 232 inch 750 F. P. M. Newsprint Machine
(This is a repeat order)

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One Drive—for 234 inch 1000 F. P. M. Newsprint Machine

Send Your Inquiries to

HARLAND ENGINEERING COMPANY, Ltd.

Care THOS. H. SAVERY
1718 Republic Building
CHICAGO

102 St. Antoine Street
MONTREAL
CANADA

Canada is receiving annually from the United States about four million tons of Anthracite coal and from ten to fifteen million tons of bituminous coal, both valuable natural resources which are not replaceable as is timber growth. This feature should have, and I believe will have, proper consideration by both countries.

We are glad that our neighbors to the north are in so strong a position as to the production and sale of pulp and paper. The United States, by its policy of an open market, to them, has provided a factor as essential to success as are natural resources. Indeed, the entire North American continent should be viewed as a single unit in this great industry. With these two countries lie the possibilities that make for completeness in the industry; forest resources, fuel supply, managerial and engineering capacity, and lastly, a market for the product which is as essential a factor in industrial success as any of those mentioned, and without which, natural resources could not be profitably utilized. Approached in this spirit on both sides, our economic problems will find a mutually satisfactory solution.

In view of all this, the necessity for early action on the part of the United States in adopting a practical and effective forest program, is clearly indicated.

Three and a half years ago the Forest Conservation Committee of the American Paper and Pulp Association made a concise, but comprehensive report upon the necessity for the practice of forestry upon the timberlands of the Northeastern states if the pulp and paper industry is to be a permanent one in that region, and also announced its belief in a policy of co-operation between the federal and state authorities and timberland owners in working out the solution of this most vital problem.

This statement of policy was given unanimous approval by the association, as was a further and more detailed statement of the same character at the annual meeting just three years ago, the committee being then authorized to co-operate with all the other individuals and agencies who might be working in the same direction for the accomplishment of the same purpose. The result was the organization of the National Forestry Program Committee, representing a nation-wide diversity of interest. A member of your committee is the Chairman of this National Committee.

Proposed legislation, based upon the co-operative principle, has been before the House of Representatives for the last two years. The most extensive and carefully prepared hearings ever held upon any forestry measure introduced into Congress have been had upon our bills. The result has been a greatly increased public interest and understanding of the necessity for immediate steps for the better preservation and utilization of our timber supply, and especially the realization by members of Congress that action can be no longer delayed.

Federal appropriations for co-operation with the states in fire prevention have been materially increased since our efforts began. The policy of purchasing mountain land in the eastern states for National forests has been sustained and appropriations made therefor in the face of drastic cuts in many lines of Governmental expenditure. A general law authorizing exchange of National forest land or timber for privately owned land within the boundaries of the National forests and thus permitting the blocking up of both the privately and publicly owned holdings for better administration went into effect a year ago. All these items were a part of the original proposed legislation and were supported by your Committee.

We have thus far asked for hearings only by the Committee on Agriculture of the House. A special committee on reforestation consisting of five prominent members of the United States Senate was created in January, and this committee has already held extensive hearings in Washington and the South. It will hold hearings in the West during the summer and in New England early in the fall. The committee consists of Senators McNary of Oregon, Moses of New Hampshire, Couzens of Michigan, Harrison of Mississippi and Fletcher of Florida. It is taking hold of the work in very earnest fashion and a report which will stimulate action is looked for when Congress reconvenes in December.

Three years ago there was a great deal of talk in favor of arbitary bureaucratic control from Washington of the cutting of timber upon private lands throughout the country. Today it is generally conceded that such a measure, if passed, would be unconstitutional, and, still further, that were it constitutional the desired results could not be secured.

Timber will not be grown upon privately owned lands (and this is three-quarters of the timberland of the United States) unless fire prevention, taxation and market returns are such that it is safe and profitable for capital to embark in the enterprise.

Cleveland
WORM GEAR
REDUCTION UNITS

Cleveland Worm Gear Reduction Unit applied to revolving screen. Motor 25 hp. at 860 r.p.m. Ratio in worm drive, 7½ to 1.

The Modern Shop Features Freedom from Noise

Did you ever listen to the noise of a common reduction gear?

The older it gets the worse it gets.

Modern shop practice calls for freedom from unnecessary noises.

This suggests Cleveland Worm Gear Speed Reduction Units.

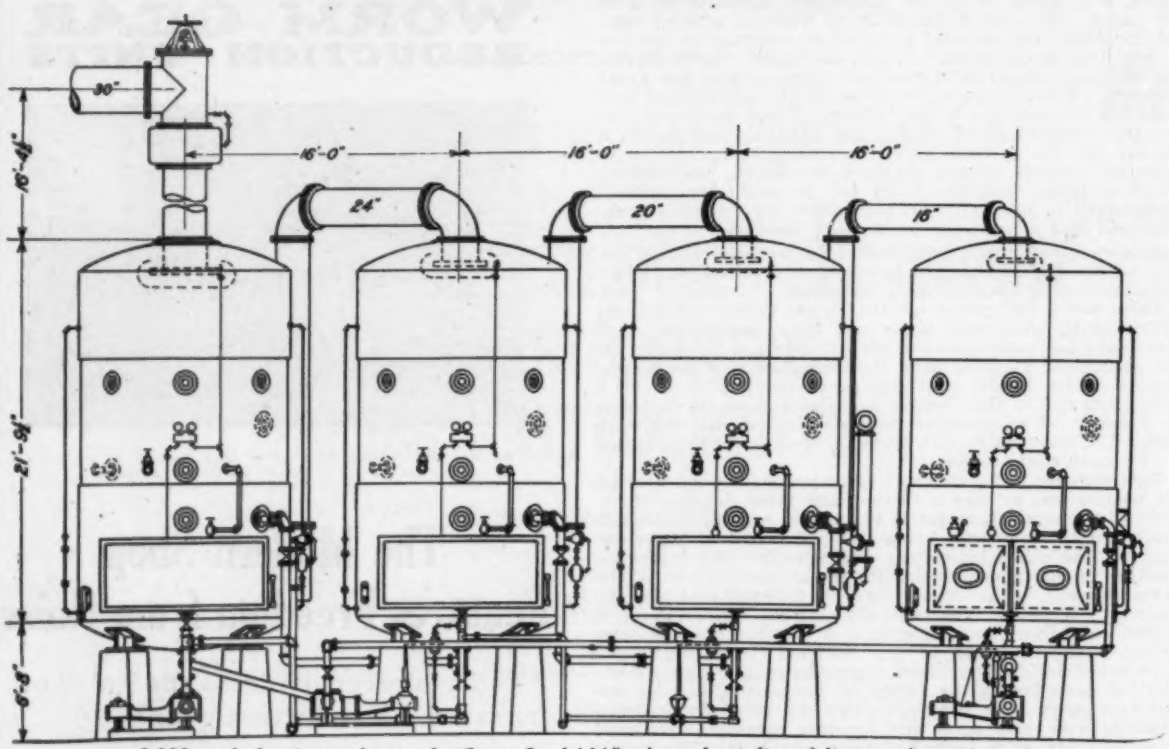
A hardened, ground and polished steel worm and a bronze gear running in a cushioning bath of oil—and all completely enclosed—no wonder it is the quietest gearing in the world.

If you don't know about it investigate. We will gladly submit complete information. Write

The Cleveland Worm & Gear Co.
America's Worm Gear Specialists
CLEVELAND, OHIO

TWO QUADRUPLE EFFECT ZAREMBA EVAPORATORS

SODA OR SULPHATE LIQUOR



3,000 sq. ft. heating surface each effect. Steel 1¼" tubes. Immediate delivery. Attractive prices.

BRAND NEW BOILERS

BARGAIN PRICES—IMMEDIATE DELIVERY

One complete battery of 10 823 HP B & W Stirling Boilers, 200 lb. pressure, ASME code; never set up. Complete with soot blowers, superheaters, Taylor stokers, coal and ash handling equipment, feed water heaters, piping, pumps; in fact complete boiler room equipment. Prefer to sell as complete unit but would consider splitting up to meet requirements of customer.

Two B & W Stirling boilers, 750 HP, 175 lb. pressure; never set up. Complete with Greene stokers, soot blowers, superheaters, full catalog fittings.

SLIGHTLY USED BOILERS

Eight 520 HP B & W boilers, 175 lb. working pressure, equipped with Roney stokers, superheaters, coal and ash handling equipment, complete catalog fittings. Prefer to sell as a complete unit, but will split up to suit requirements of customer.

Six 600 HP Edgemoors, 160 lb. pressure, complete catalog fittings, lower half of fronts omitted.

Two 501 HP No. 25 Class S, B & W Stirling Water Tube Boilers, 156 lb. pressure ASME; Detroit stokers, Diamond soot blowers, Dietrich arches, B & W superheaters.

One 367 HP Heine Water Tube Boiler, 160 lb. pressure.

One 450 HP Heine, 150 lb. pressure.

One 72" x 16' Ames, 125 lb. pressure.

Two 250 HP Wickes Waste Heat Vertical Boilers, rebuilt and in first-class condition, 125 lb. pressure.

One complete battery of 5 1043 HP Edgemoor Water Tube Boilers, 200 lb. pressure, ASME Code, Taylor stokers, soot blowers, coal conveying and ash handling equipment, piping, heaters, pumps, breeching stacks and building steel for erection of complete boiler house. Six months' actual service.

COMPLETE PULP MILLS

3—Complete pulp mills all departments building steel 50 to 100 tons daily capacity.

SULPHUR BURNERS

2—48" x 14' burners with combustion chambers.

4—48" x 20' burners with chambers.

NON-CONDENSING TURBOS

1—300 KW.—3600 RPM.—2300 volts 3-phase 60-cycle.

1—1250 KVA.—2300 volts.

FEED WATER HEATERS

1—5000 Horsepower Webster.

1—1000 Horsepower Cochrane.

TECHNICAL ECONOMIST CORPORATION

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Telephone
Whitehall 5243

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Herenco

The remedy for timber shortage is to grow more timber, not to drive present capital out of the forest industry.

It is most gratifying that the President of the United States both in his annual message to Congress last December and again in his letter to Representative Clarke of this State on January 24th of this year definitely approved the plan of co-operation which our Committee has stood for from the first. In the latter statement the President said:

"I am very glad therefore, that the Committee on Agriculture feels that we have come to a time when definite provision should be made for larger co-operation between the Federal Government, the States and the private owners, with a view to working out a National policy covering the growth, protection, conservation and use of timber."

We have now the best opportunity that has ever existed to secure both National and state legislation of a character that will make possible the maintenance of our timber supply. Your committee asks every member of the American Paper and Pulp Association to stand squarely behind its back and hold up its hands in every effort that may be made in this direction.

Arthur H. Nevius, chairman of the Advisory Committee from the Paper Industry for the Bureau of Standards, was unable to be present, and Dr. Baker submitted the following report as prepared by Mr. Nevius:

REPORT OF THE ADVISORY COMMITTEE

By A. H. Nevius, Chairman

This committee was appointed January 4, 1921, by the president of our association in response to a request from the Bureau of Standards for the appointment of a committee to advise with them as to the needs of our industry insofar as the solution of scientific problems, relating to production and the testing of paper, are concerned.

Several meetings were held in Washington during 1921 and 1922. In August, 1921, the committee discussed a progress for the study of the standardization of paper with representatives of the Paper Section of the Bureau of Standards, the printers and paper merchants.

By July, 1922, we found it advisable to increase the personnel of the committee so as to have representatives act as chairmen of sub-committees appointed to handle data related to each of the ten groups into which the industry had been divided. These appointments were promptly made and accepted.

At this July meeting, the Paper Section submitted certain classifications, definitions and technical problems for our consideration. These were referred to the several sub-committees, and at a meeting in Washington on September 25th, partial reports from these committees were read and discussed. Complete reports from our sub-committees have now been filed with our Secretary, and are being edited for publication.

These reports have been very carefully and thoughtfully worked out and we believe will be of very great help to the Bureau of Standards in its work for the paper industry. The sub-committee men have taken their tasks seriously and are to be congratulated on the character and comprehensiveness of their reports.

The Committee has accomplished the following:

1—Has become familiar with the facilities of the Paper Section for research problems that have and will benefit the paper industry.

2—Has assisted in determining what problems of paper production and testing could be investigated by the Paper Section to the greatest advantage of the industry.

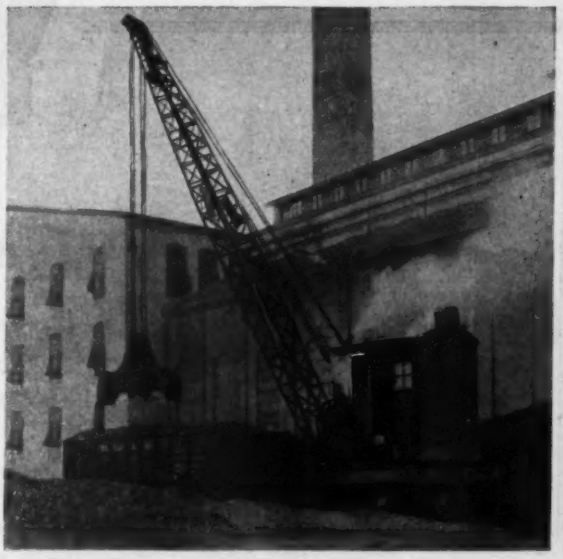
3—Has co-operated very closely with the Paper Section of the Bureau and supplied samples of paper and voluminous data in connection with the development of a method for measuring the color of paper, and in a study of clay retention.

4—Has adopted and recommended the report of the Technical Committee of the Bureau of Standards (published in the Paper Trade Journal, September 14th, 1922) in regard to the sampling and testing of paper, tolerances to be applied to test data, and the standard basis of weight 25x40—500 for all grades of paper.

5—Has advised in regard to the program of the simplification of the sizes of paper.

6—Has made comprehensive reports containing definite recommendations in regard to the classification and definition for the ten main classes of paper and their subdivisions.

In view of these facts we believe that an Advisory Committee should be maintained by our association for conference with the Bureau of Standards and that this committee should take an active part in the work of the Paper Section and help, whenever possible, with its practical and moral support.



Our Best Labor-Saving Device

Writing us recently the president of the Kalamazoo Vegetable Parchment Co. said, "We appreciate very much the receipt of your catalog, as it gives us a good many ideas which we will undoubtedly incorporate into our new mill.

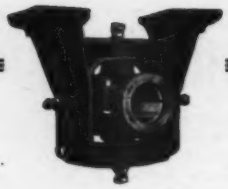
"We are mighty glad to know that you make other things beside locomotive cranes, one of which we purchased from you some years ago, and which we have found in every respect the best labor-saving device that we have about our entire plant."

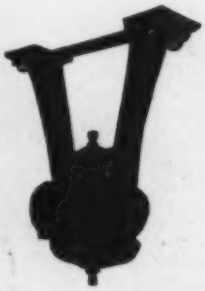
If you are interested in the handling of materials we want to remind you that Brownhoist is also interested in this subject. Over 40 years of engineering and crane building experience can be yours on any handling subject. And perhaps we can give you some valuable information, as we did the above company.

The Brown Hoisting Machinery Co.
Cleveland, Ohio

Branch Offices, New York, Pittsburgh, Chicago, San Francisco and New Orleans

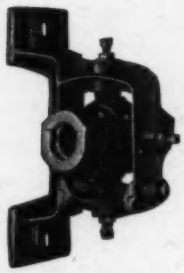
BROWNHOIST





CLEVELAND TYPE
HILL COLLAR OILING BEARING

(Patented)

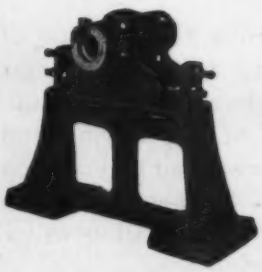


Such universal satisfactory service has been obtained from our Standard Type Hill Collar Oiling Bearing that it would be hard to convince many of our customers that any other design could be superior.

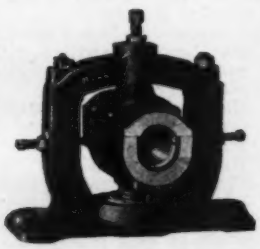
Since placing upon the market, several years ago, the new Cleveland Type we have manufactured both designs, leaving it to our customers to decide which they preferred. After several years our experience, and that of our customers, has demonstrated that the Cleveland Type is the better and more popular line.

The mountings have all been re-designed and contain many improvements, the natural results of an accumulated experience of thirty-nine years.

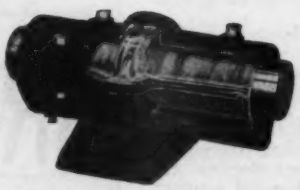
Although we appreciate there are some who would say that it is not good business judgment to disturb a satisfied customer, our experience after manufacturing both types for many years has been such that we recommend the Cleveland Type, not only to new customers, but also to our old customers who have been obtaining most satisfactory service from our older Standard Type Bearing.



EFFICIENT DURABLE ECONOMICAL



THE HILL CLUTCH CO.



GENERAL OFFICES AND PLANT
Cleveland, Ohio

NEW YORK OFFICE
50 Church St.

In submitting this report I beg to mention the personnel of the Committee as follows, thanking them for the earnest support given to this work, and also to Mr. C. M. Porter, secretary of this Committee:

Fred C. Clark, Pejapscot Paper Co., Brunswick, Me.
H. W. Ellerson, Albemarle Paper Mfg. Co., Richmond, Va.
H. E. Fletcher, Fletcher Paper Co., Alpena, Mich.
Geo. A. Colliver, American Writing Paper Co., Holyoke, Mass.
Alexander Gilman, Allied Paper Mills, Kalamazoo, Mich.
C. A. Gordon, Oxford Paper Co., New York City.
R. S. Hatch, Hamersley Mfg. Co., Garfield, N. J.
Norman Harrower, Linton Bros. & Co., Fitchburg, Mass.
R. Frank McElwain, Crocker-McElwain Co., Holyoke, Mass.
Ernst Mahler, Kimberly-Clark Co., Neenah, Wis.
M. E. Marcuss, Bedford Pulp & Paper Co., Richmond, Va.
C. E. Nelson, Mac-Sim-Bar Paper Co., Otsego, Mich.
J. C. Schmidt, Schmidt & Ault Paper Co., York, Pa.
D. A. Smith, D. of C. Paper Co., Washington, D. C.
Frank L. Stevens, Stevens & Thompson Paper Co., North Hoosick, N. Y.
H. W. Stuart, The U. S. Paper Goods Co., Cincinnati, O.
F. E. Taylor, Taylor-Logan Co., Holyoke, Mass.
W. J. Raybold, President, American Paper & Pulp Association.
Dr. H. P. Baker, Secretary, American Paper and Pulp Association.

Respectfully submitted,
A. H. NEVIUS, Chairman.

The following resolutions as presented by the Resolutions Committee were read and formally adopted:

REPORT OF RESOLUTIONS COMMITTEE

Whereas, the paper industry is one of America's basic industries, and

Whereas, paper is a vital requirement of every line of every business, therefore be it

RESOLVED, that the American Paper and Pulp Association assembled in its forty-sixth annual convention expresses its attitude toward national problems and problems of the paper industry as follows:

1. The Association approves a budget system for the government and that the Government should live within its income.

2. The Association favors strengthening the United States Tariff Commission if possible, making it a non-partisan and permanent body of experts, serving every industry and the public in a fair and effective way.

3. The Association favors more effective support by the Government of research work at the Bureau of Standards and at the United States Forest Products Laboratory particularly along lines of value to the paper industry.

4. The Association urges better support of the activities of the U. S. Department of Commerce and especially of the Bureau of Foreign and Domestic Commerce.

5. The Association believes in closer co-operation between all associations in the paper industry, with clearer lines of demarkation between the activities of the central and the affiliated associations; elimination of duplication and better support of association work generally.

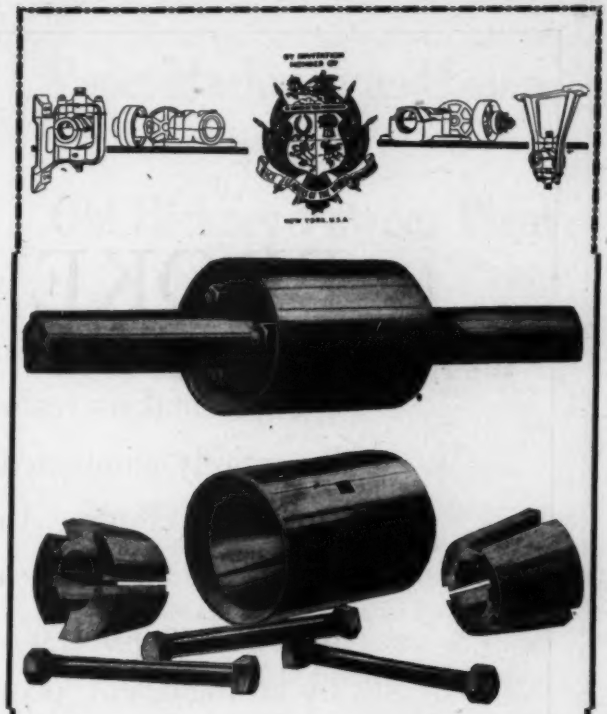
6. There should be more active participation of associations in foreign trade activities.

7. The Association urges support by paper manufacturers of the U. S. Chamber of Commerce. Every manufacturer should be an individual member, as the Chamber is the one big businessmen's organization of the country representing business at Washington.

8. Inasmuch as the capital invested in the pulp and paper industry is very large in comparison with the annual turnover, which makes it essential that a fair margin of profit should be obtained on all sales if the industry is to be placed on a sound economic basis, all manufacturers are urged to adopt the policy of basing their selling prices on correctly determined costs and to give their moral and financial support to the Cost Association of the Paper Industry which is working to promote the use of correct cost methods within the industry.

9. As better knowledge and practice is fundamental in the development of right manufacturing methods, we believe stronger support should be given the Technical Association of the Pulp and Paper Industry, the American Pulp and Paper Mills Superintendents' Association and the Woodlands Section of this Association.

10. That the Salesmen's Association of the Paper Industry deserves the support of the entire industry because it stands for sound progressive salesmanship trade expansion based on facts and business confidence.



A Coupling that is as Strong as the Shaft Itself

The Double Cone Compression Coupling, as we make it, is absolutely the strongest coupling of the compression type.

Correctly proportioned to transmit the full capacity of the shafts it connects.

Each shaft is firmly held by a separate cone, and the cones are wedged and keyed into a continuous double-tapered sleeve or cover, overcoming any slight variation in shaft sizes, thus insuring perfect alignment in all cases. Then, too, they are

Easily Applied or Removed

We also make a belt type, Flexible Coupling for directly connecting Motors or Engines to Shafts or machines, and, in fact, everything for the mechanical transmission of power by belts or ropes.

T. B. WOOD'S SONS CO.
CHAMBERSBURG, PA.

POWER TRANSMITTING MACHINERY

BROKE!

Paper makers realize that broke will never be entirely eliminated, in spite of their most strenuous efforts. But how many of them appreciate that they can minimize the most aggravating kind of broke—that produced by an inefficient, poorly designed roll-winder that sends perfect stock back to the beaters?

A great many paper mills have taken out "broke insurance" as far as the slitting and roll-winding processes are concerned, by installing CAMACHINES—the product of more than twenty years' experience devoted exclusively to the development of slitters and roll-winders.

CAMERON MACHINE COMPANY
61 POPLAR STREET BROOKLYN, NEW YORK

Swedish Strike and Coal Messages

Secretary Baker then read the following messages, the first of which was the latest word on the Swedish wood pulp strike situation as received in a cablegram to Dr. Baker from Stockholm dated April 11:

"Pulp sawmills conflicts have ended. Nearly all sawmill men have gone back to work. This afternoon woodpulp laborers Subdsvall district ratified agreement thereby assuring its general acceptance. Pulp mills will gradually recommence operation beginning within a few days. Basis for agreement was medium wage of 1922 and is to be in force until end of 1924."

The following telegram was from J. D. A. Morrow, formerly executive officer of the National Coal Association, who spoke before the fall business conference of the American Paper and Pulp Association in Chicago last fall, in reply to a telegraphic request from Dr. Baker for a word on the bituminous coal situation:

"The outlook for the bituminous coal business is peculiarly difficult to estimate this year. Some conditions which contribute to this uncertainty are first the extent and duration of the present business revival and the effect it will have not only by increasing the demand for coal but also by diverting open top cars from coal service. Second the uncertainty as to the extent of export coal business especially affecting our higher grade coals occasioned by the loss of German coal production in the Ruhr. Third the doubt as to what coal tonnage our railroads can handle as their traffic increases with the expansion of general business and the burden of moving crops. Fourth the expiration of the anthracite wage contract in September and of the bituminous agreement next April with the accompanying possibilities of suspension or strikes. No wage reductions are expected during the year hence production costs will remain on the present high levels and will keep prices from going much below present figures. Personally anticipate active coal business with steadily increasing demand as the year advances."

Five-Minute Talks

The closing feature of the general meeting of the association were five-minute talks by representatives of the trade associations affiliated with the American Paper and Pulp Association. George E. Williamson, president of the Technical Association of the Pulp and Paper Industry, stated that probably the outstanding feature of the Technical Association's year was the formulating of a policy of definite work. The subjects now being considered in accordance with this program, Mr. Williamson said, were, first, waste in the industry, and second, the drying of paper. He added that the work of the Technical Association along educational lines was being continued, that the papermaking text books were now in general use and that three educational institutions were giving a technical course in papermaking as outlined in the association's text books.

Col. B. A. Franklin, of the Strathmore Paper Company, Mittineague, Mass., appeared in behalf of the Cost Association of the Paper Industry in place of C. A. Jasperson, president of that body who was unable to be present, and stated that one thing of particular importance which the Cost Association had undertaken was to develop a chart for compiling figures on standard production, details of labor, etc., which, when all the necessary data has been collected, will be distributed to the members of the association.

H. H. Reynolds, president of the Salesmen's Association of the Paper Industry read a brief statement outlining the purposes of his association.

C. E. Nicely, of the La Salle Paper Company, South Bend, Ind., outlined the work and purposes of the Superintendent's Association.

Following the election of officers, retiring president Raybold invited the newly elected president, Henry W. Stokes, to speak. Mr. Stokes thanked the members of the association for the confidence imposed in him by electing him to the presidency, and stated that he accepted with a great deal of pleasure and a good deal of trepidation because of the work which he realized lay before him. He added that he would endeavor to be a president of few words "but plenty of action."

Prior to the close of the meeting, Mr. Raybold, in a few well-chosen words, thanked all the members of the association, and particularly the Executive Committe for their unstinted help and guidance during his administration, and said that he would always cherish the associations of officers and members during his tenure of office.

Luncheon to Swedish Minister

Following the general meeting a complimentary luncheon to the Swedish Minister to the United States, Hon. Axel Wallenberg, was given at the Waldorf by officers of the

Paper Machinery and Equipment at Old Hickory Powder Plant Now Released for Immediate Disposal

24—Mammoth Jr. Jordan Engines. Maker Noble & Wood Co. Shell 5′ 6″ long, with 10-inch inlet and 6-inch outlet. Capacity, 30 tons per 24 hours. Will run either direction at 350-375 R. P. M. Fitted with steel bar knives, block and oak fillers.

40—Welded Steel Digesters, Maker Continental Iron Works. Capacity, 1300 cubic feet. Inside diameter, 8 feet. Length overall, 27 feet. Working pressure, 110 lbs. per square inch. Tested 165 lbs. per square inch. Each digester complete with cast iron supporting ring, cast iron false bottom, hoppers, guides, and all accessories.

200—Wood tanks new and used.

SIZE	CAPACITY
12 ft. 6 in. x 11 ft.	15,150 gal.
12 ft. 6 in. x 18 ft.	16,680 gal.

1500—Steel Tanks—capacities, 100 to 55,000 gallons.

Let us submit complete specifications and quote prices that will save you money.

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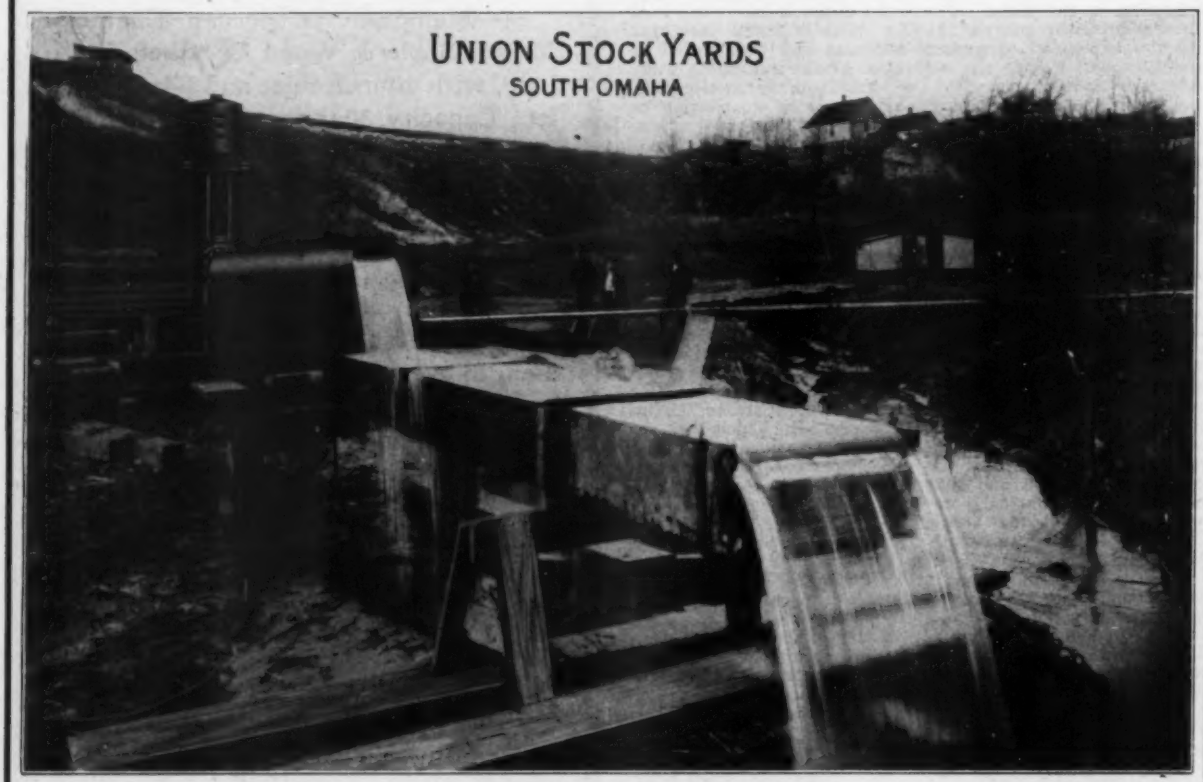
You will never be short of water at Your Paper Mill if you install Gregg Propeller Pumps in your tubular wells. You do not need more wells. You need Gregg propeller pumps to develop your present wells to their full capacity and give you greater pumping economy.



Testing Ten Inch Tubular Well for Union Stock Yards Company. One million Gallons of Water per day pumped from this well during a Twenty-four Hour Test. Fourteen Gregg Propeller Pumps have been installed in this plant.

We have our deep well pumps in successful operation at the Kalamazoo Vegetable Parchment Co., the Bryant Paper Co. and the Allied Paper Mills, Kalamazoo, the Alton Box Board & Paper Co., Alton, Ill., and many other prominent plants. If you are short of water at your plant we are prepared to help you out. Send us your well data, we will do the rest.

GREGG PUMP COMPANY

1417-1425 Fulford Avenue **Kalamazoo, Michigan**

American Paper and Pulp Association. The luncheon was of informal character, and the remarks of those called on were extemporaneous. Mr. Wallenberg said, in part:

"Sweden has been studying its forestry problem for 400 years. We have such a great faith in America's wonderful enterprise, that we are hoping America will be able in the next forty years to establish a forestry policy that will make for a strong national sentiment in the United States such as we have in Sweden. The importance of the forest in our national life has done much to create a strong national feeling. We believe in maintaining unimpaired our forest capital, by taking no more from our forests than is replaced by the annual growth.

"We have such a strong belief in your people that we know if you lay out a forest program, you will carry it out in a way to astonish the world.

"I hope the time will come when we shall be able to have fine conferences of the pulp and paper manufacturers of all the paper producing countries. This compliment you have given us today, by having me as your guest, I hope is only a forecast of closer relations between us all."

American Paper and Pulp Banquet

Close to a thousand members and guests, among them nearly all of the leading manufacturers, jobbers and mill agents of the country and Canada, attended the forty-sixth annual reception and dinner of the American Paper and Pulp Association in the Grand Ball Room of the Waldorf-Astoria Hotel, New York, on the evening of Thursday, April 12, which brought to a close the annual convention of this body. The ball room was decorated with American flags from the top of the third tier of boxes to the lower edge of the first tier, while two immense Stars and Stripes were hung at the south end of the room behind the speakers' table. Hanging on either side of this wall at the ends of the speakers' table were the State flags of Idaho and New Jersey, in honor of the home States of the two principal speakers of the evening.

Retiring president Walter J. Raybold acted as toastmaster, and either side of him sat the two chief speakers, the Hon. William E. Borah, United States Senator from Idaho, and James M. Beck, Solicitor General of the United States. The third and only other speaker, the Rev. Dr. Nehemiah Boynton, of Brooklyn, N. Y., was seated several chairs to the right of Senator Borah.

During the serving of a sumptuous nine course dinner, the Waldorf orchestra played oldtime and popular melodies, in which the diners joined in singing, the words of the songs being flashed on a big screen where everyone could see them, and led by several professional singers. "In the Good Old Summer Time," "Annie Laurie," "Old Black Joe," "Smiles," "It's a Long, Long Trail," and numerous other refrains were sung with much fervor, and one group of diners insisted on chanting at the end of each song "She Lived Down in Our Alley," until they ultimately had the entire gathering joining in with them in this closing note.

There were two new features introduced at this year's annual banquet of the papermakers. One was the broadcasting of the speeches by radio over a radius of a thousand miles from New York. The other was the introduction by retiring President Raybold of the newly-elected officers of the association, President Henry W. Stokes, and Vice President Norman W. Wilson. These gentlemen refrained from any remarks whatsoever, but stood when introduced, and the entire assemblage paid its respect by rising with them.

Hon. James M. Beck Speaks

All three speeches were bristling with the theme of Americanism and patriotism. Solicitor General Beck was the first called on, and he elicited a good deal of laughter by his witty remarks in connection with his preceding Senator Borah in speaking. Mr. Beck's speech was on the subject of "What Ails Human Society." He touched on various topics, including the situation—political and economic—in Europe, the business and political conditions in the United States, and showed very clearly that he was a faithful reader of Shakespeare by frequently quoting the writings of the immortal playwright. He paid quite a compliment to the paper industry in saying that this industry was one of the oldest and most beneficent of all the world's industries, and that the invention of paper was one of the foundations of civilization because it enabled men to preserve and hand down thought from generation to generation.

He pleaded for close co-ordination of the business interests of the country with the political parties, and said that the salvation of American industry depended in large measure on the clarification of man's mind and the ability of labor and capital and government to work harmoniously and effectively together.

Double Stroke Deep Well Head Size 3L, Arranged for Belt Drive.

Write for Bulletin 27-C

A. D. COOK, Inc.

Lawrenceburg Indiana

Manufacturers of Single and Double Stroke and Double Acting Steam and Power Deep Well Pumps, Working Barrels, Rods, Foot Valves, Strainers and a Full Line of Water Well Supplies.

The accompanying half tone shows the design of our Double Stroke Deep Well Power Head, which is the most efficient Type of Deep Well Plunger Pump.

LEFFEL

TURBINE WATER WHEELS

HIGH SPEEDS, HIGH POWERS, HIGH EFFICIENCIES

All of our turbines are designed and built to suit location and requirements, by engineers and experts who have had years of experience in this particular line of work. Turbines fully guaranteed.

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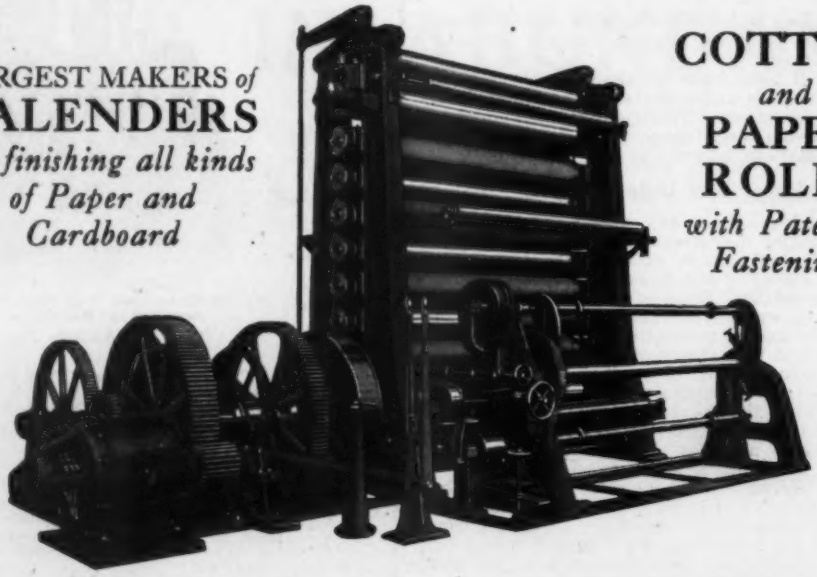
Makers of Improved Machinery for Wood Pulp and Paper Mills

LARGEST MAKERS *of*
CALENDERS
for finishing all kinds of Paper and Cardboard



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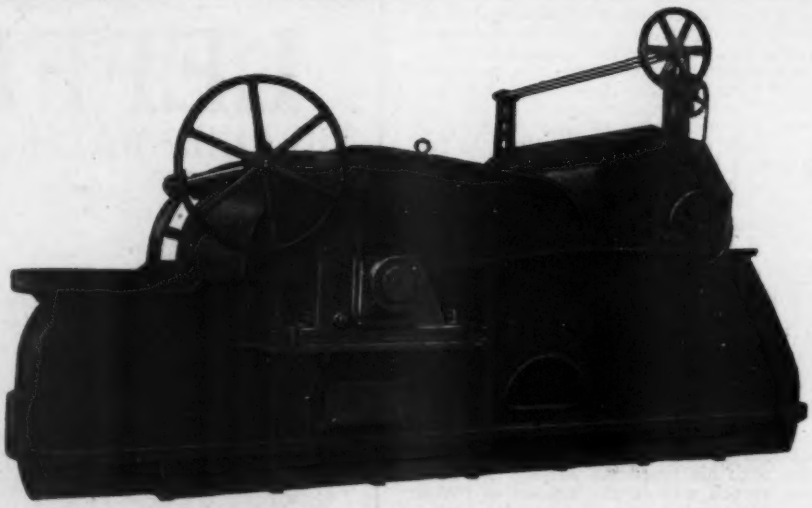
Finishing Machinery *for* Lithographers *and* Playing Card Manufacturers



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Wood Barkers, Wood Chippers, Wood Pulp Grinders, Rag Cutters, Rag and Paper Dusters, Washing and Beating Engines with Patent Double Hoist and Tubs of Wood or Iron. Reeling Machines and Straining Machines for Coated Paper, Hydraulic Pumps and Presses

SPECIAL MACHINERY TO ORDER FROM ORIGINAL PLANS

Hercules Turbine Wheels with All Connections for Power Equipment

Hon. William A. Borah Talks

Senator Borah devoted the major part of his speech to the subject of the League of Nations and the proposed World Court which is to be attached to the League and in which President Harding is in favor of the United States becoming a party to. Many of his declarations against the League and the World Court were made in a good-tempered reply to recent utterances in this country of Lord Robert Cecil.

The Senator said, in part:

"The absolute prerequisite to establish law and order in international affairs is to separate these matters in so far as we can from the control of the politics of the foreign officers of the different governments of the world. I speak, of course, with the utmost respect for these institutions, but we have experimented with them in different ways for 2,000 years and the foreign officers of the world have been the most successful breeders of war of any institutions which the human mind has ever conceived. Once we can establish law and a court separated from them and divorced from the politics of foreign affairs we shall, in my judgment, have taken the first step toward permanent peace in the world."

Launching into his reply to Lord Robert Cecil, Senator Borah said that the British visitor had admitted that, though the World War was fought to end war, Europe carried a heavier military establishment today than at the outset of that struggle. Then he asked:

"How do we account for it? By whom are these military establishments being set up? What nations are establishing the heavy armament? Not the nations with whom we were at war. They are being established by the victors in the great struggle. And against whom are they building up these great armaments? Certainly not against Austria. Certainly not against Hungary. Certainly not against Germany in her present condition. Against what nations are they arming? If there is any reason for the armament other than that of the mad desire to arm, it must be that they are arming against those with whom they were associated in the great war.

"That seems almost impossible. But when you reflect that the sole basis of international affairs of today is that of force, when you reflect that the nations of the world contend that the only arbitrator in international affairs is war, you readily see why it is that every nation arms, regardless of whether or not there is any enemy in sight. If the sole arbitrator is to be that of force, if the ultimate decision is to be rendered by that of arms, just so long as that continues, the nations of the world will continue to arm. And Lord Cecil truly said that the first thing we have to do is to get rid of this idolatry of force.

"The patios of diplomacy may still have its usefulness where concealment and suspicion are still a part of the game, but out in the open and before the people, whose cause the cause of peace is, let us, when we discuss this subject, speak plainly. The American people do not believe that the governments of Europe—the leading governments of Europe—want peace upon any basis compatible with justice, and they believe that where two sources are open, one, that of conciliation, justice and peace; and another, that of material gain, dominion and war, they will inevitably choose war."

The Senator said that the Treaty of Versailles was not a treaty of peace, but a treaty of war, and continued:

"These same nations which were pledged to peace have on three separate occasions financed munition and invasion of Russia in defiance of every pledge of peace. Greece was incited to war to her utter humiliation and defeat, and Turkey was nursed back into power, both nations acting for no other reason than for dominion and control of territory.

"A short time ago when the question of reparation was involved between two great nations, in spite of accepting conciliation either at the hands of the League or of some special conference; instead of accepting adjustment, they chose that of aggression and war because it is no less."

After making it plain that he wanted to see France get the reparations which were due to her, Senator Borah went on:

"If they want to write into the international code, if they want to write into international law a denunciation of war as a legal institution; if they want to write the law so that those who choose war instead of peace may come under the lash of the law, then will be time enough for the American people to undertake to co-operate with those who want war instead of peace throughout the world. But say that this is fanciful. It was said a few days ago by a learned jurist that that was a fanciful proposition.

"What is the use of talking to people about eliminating an institution upon which you are unwilling to put the brand of illegality? I say to the millions throughout the country that we are going to eliminate war when we are willing to

Pickles' Patent
Automatic Steam Regulator
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Which absolutely control the drying of the sheet. Installed on sixty days' trial

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MANUFACTURERS OF
WARREN IMPROVED CALENDER DOCTORS
With Flexible Blades, Universal Adjustment and Control
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other Paper Mill Specialties
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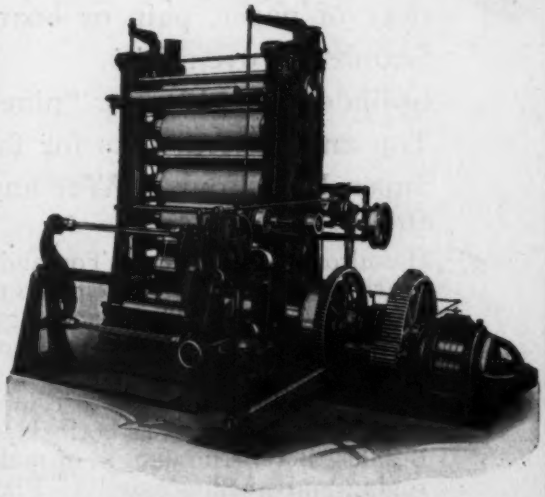

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Miami Woolen Mills

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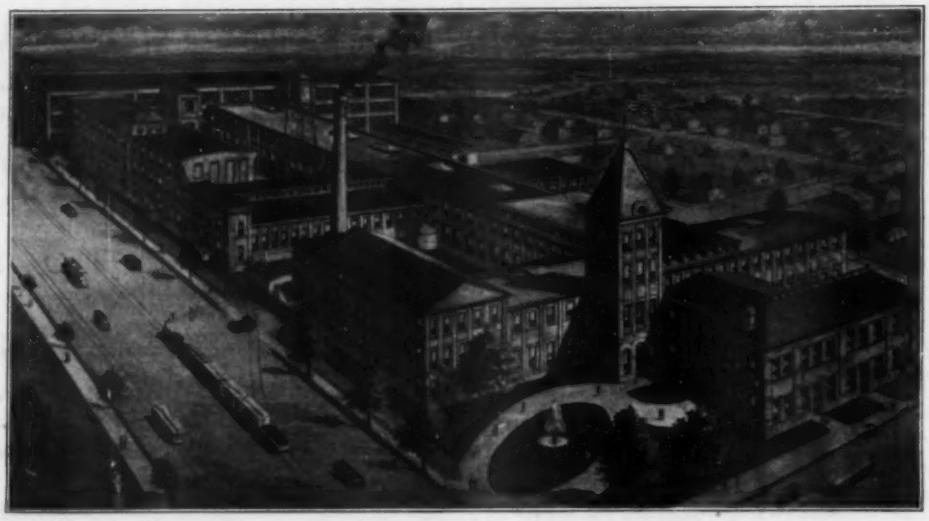

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We manufacture felts suitable for use in making every variety of paper, pulp or board.

Seamless woven felts.

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Top and Bottom felts for fast running machines on board.

Super Fine Fourd. Wet and Press felts for writing, book and bond papers.

Hamilton Sateen Weave Top and Bottom felts with a one-sided finish for board give better satisfaction to the user than any other make of one-sided finish felts. They run longer and never "roll on the edge." For use in combination with the Sateen Weave felts we recommend our "A" Plate Press felts. These latter stand at the head of the Plate Press felt class. Board makers use our "A" Plate Press felts in preference to one-sided Press felts, as both sides of the "A" Plate Press felt can be used. Besides there is no danger of making badly marked board at night, after roping and washing our "A" Plate Press felt, should the latter be turned bottom side up.

Samples of felts and jackets will be submitted and prices on your sizes will be quoted upon request.

write into the code of nations that it is an illegal institution.

"Let us organize the public opinion of the world as we have time and time again organized the public opinion of the world for war, let us organize it for peace and call it to the cause of peace. Before public opinion well organized, nothing can stand."

Dr. Boynton's Address Thrills

Dr. Boynton took as his subject the prejudice existing in the United States and throughout the world today. He traced this evil from the home, through industry, through government to the feeling between nations. He came out flat-footedly in favor of the League of Nations and the World Court, and answered many of the assertions made by Senator Borah and Solicitor General Beck. He was easily the "hit of the evening". His hearers appeared to be heartily in accord with his statements and applauded him far more loudly and often than they had the two preceding speakers.

Divisional Meetings

Tissue Paper Manufacturers' Association

At the annual meeting of the Tissue Paper Manufacturers' Association Tuesday morning, John Drannan, of the North End Paper Company, Fulton, N. Y., was re-elected president for the ensuing year. J. M. Ross, of the Sauquoit Toilet Paper Company, New Hartford, N. Y., was elected vice president, and E. H. Naylor was again chosen secretary and treasurer. Messrs. Brannan and Ross together with A. D. Coffin, of C. H. Dexter & Sons, Inc., Windsor Locks, Conn.; W. L. Heath, of the West Milton Paper Company, New York City, and L. C. Jeffress, of the Wortendyke Manufacturing Company, Richmond, Va., were elected to compose the Executive Committee. President Brannan was selected to represent the organization as a member of the Executive Committee of the American Paper and Pulp Association.

Gummed Paper Manufacturers' Association

That an advertising campaign to promote the use of gummed tape is already well under way, was the announcement made at the annual meeting of the Gummed Paper Manufacturers' Association on Tuesday morning. The campaign is a part of the decision of the association to work for the general recognition of fixed standards of quality for gummed tapes, and the members of the association adopted a trade mark which will serve as a guarantee that the tape sold by the members is up to the approved standards of strength and quality.

C. H. Crowell, president of the Crowell Corporation, Brooklyn, N. Y., was re-elected president of the association; Phillips Kimball, of the Liberty Paper Company, New York City, was re-elected vice president, and Jacob Erichsen was elected secretary and treasurer.

Cover Paper Manufacturers' Association

F. E. Taylor, of the Advertisers Paper Mills, Holyoke, Mass., was re-elected president of the Cover Paper Manufacturers' Association at the annual meeting of that body Tuesday afternoon. Thomas Beckett, of the Beckett Paper Company, Hamilton, O., was chosen vice president, and E. H. Naylor was again elected secretary and treasurer. Messrs. Taylor and Beckett, with D. L. Quirk, Jr., of the Peninsula Paper Company, Ypsilanti, Mich., compose the Executive Committee. Mr. Taylor was elected a member of the Executive Committee of the American Paper and Pulp Association.

Vegetable Parchment Manufacturers' Association

The Vegetable Parchment Manufacturers' Association elected W. F. Brunner, of the Paterson Parchment Company, Passaic, N. J., as president, and O. B. Towne as secretary and treasurer at its annual meeting Tuesday afternoon. The association decided to carry on definite traffic activities, and also to participate in a broad way in the activities of the Clean Food Association.

Book Paper Manufacturers' Association

The Book Paper Manufacturers' Association at its meeting voted to dissolve and to turn over all its records to the so-called "Book Paper Converters' Association". The change was decided on in view of the fact that the Book Paper Manufacturers' Association represented only about 40 per cent of the industry, while the converters' organization represents nearly 90 per cent. The change is more or less a change of name to make the organization more specific, as most of the mills in the old organization will continue in the newly-formed association. The permanent name of the new body was not decided on, but details of organization will be taken up at another meeting to be held May 3, either in the West or the East. Until that meeting the statistical work

Fitchburg Duck Mills
ESTABLISHED 1844
FITCHBURG, MASS.

MANUFACTURERS OF
STANDARD AND MULTIPLE PLY
DRYER FELTS

English Weave in:
Two, Three, Four, Five and Six Ply
60 Inches to 176 Inches in Width

Fine Faced Felts for Fine Papers
Absolutely No Felt Marks in Paper
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EXCLUSIVE MAKERS OF
Paper Makers' Felts

Have You Run Them?
If Not, Why Not?

Are You Interested in Accurate Running Felts?

Give Us a Trial
Get Authentic Information
Ask the Men Who Run Them

Yours for service
LOCKPORT FELT CO., Newfane, N. Y.

When a Customer Reorders

It means he's satisfied. Six months ago a large Eastern mill (name furnished on request) installed two Niagara Beaters. An order has just been received from this concern, for four additional Niagaras, with an option on three more.

The Niagara made good in this mill, as it has in so many others and as it will in yours. There it is replacing Holland type engines. It is saving floor space, power, labor and time, and making better stock.

Let us give you more information regarding the cost cutting abilities of Niagara Beaters. Write today.

Valley Iron Works Co.

Plant, Appleton, Wis.

New York Office, 350 Madison Ave.

will be continued in order not to break the continuity of production and other records, by E. H. Naylor, who has been secretary of the old Book Paper Manufacturers' Association. Alex W. Gilman, of the Allied Paper Mills, Kalamazoo, Mich., is president of the new organization, but other officers were not selected.

U. S. Pulp Producers' Association

At the annual meeting of the U. S. Pulp Producers' Association held on Tuesday afternoon the following officers were elected for the ensuing year: President, D. C. Everest, of the Marathon Paper Mills Company, Rothschild, Wis.; First Vice President, L. M. Alexander, of the Nekoosa-Edwards Paper Company, Port Edwards, Wis.; Second Vice President, E. W. Kiefer, of the Port Huron Sulphite and Paper Company, Port Huron, Mich.; Third Vice President, W. H. Savery, of the Harpers Ferry Paper Company, Harpers Ferry, W. Va., and Secretary and Treasurer, O. M. Porter.

The Executive Committee elected is comprised of Herman Elsas, of the Continental Paper and Bag Mills, New York City; George W. Sisson, Jr., of the Racquette River Paper Company, Potsdam, N. Y., and Col. A. C. Goodyear, of the Bogalusa Paper Company, Buffalo, N. Y.

Waxed Paper Manufacturers' Association

The Waxed Paper Manufacturers' Association re-elected its officers at the annual meeting of this organization Wednesday morning. C. A. Buskirk, of the Wolverine Paper Company, Otsego, Mich., was chosen president; J. W. Hurlbut, of the Bennington Waxed Paper Company, Bennington, Vt., was selected as vice president and O. B. Towne, of New York City, was re-elected secretary and treasurer.

Writing Paper Manufacturers' Association

The annual meeting of the Writing Paper Manufacturers' Association was held Wednesday morning, at which the following officers were elected for the ensuing year: President, N. W. Wilson, of the Hammermill Paper Company, Erie, Pa.; First Vice President, W. M. Crane, Jr., of Crane & Company, Dalton, Mass.; Second Vice President, Fred A. Leahy, of the Eastern Manufacturing Company, New York City, and Secretary and Treasurer, E. H. Naylor.

Messrs. Wilson, Crane and Leahy, together with the following compose the Executive Committee: W. D. Judd, of the Carew Manufacturing Company, South Hadley Falls, Mass.; H. H. Moses, of the Strathmore Paper Company, Mittineague, Mass.; E. A. Oberweiser, of the Whiting-Plover Paper Company, Stevens Point, Wis., and S. L. Willson, of the American Writing Paper Company, Holyoke, Mass. President Willson was appointed representative of the organization on the Executive Committee of the American Paper and Pulp Association.

Glazed and Fancy Paper Manufacturers' Association

A further continuance of the progressive activities begun during the last year was determined upon at the annual meeting of the Glazed and Fancy Paper Manufacturers' Association Wednesday afternoon. Among other matters discussed was the continuance of the work begun last year looking toward the establishment of uniform cost accounting methods in the mills of the members. W. H. Shuart, of the Springfield Glazed Paper Company, Springfield, Mass., was re-elected president, and N. N. Fowler, of the Hampden Glazed Paper and Card Company, Holyoke, Mass., was again chosen vice president.

Cardboard Manufacturers' Association

The Cardboard Manufacturers' Association at its meeting Wednesday elected Joseph Lowe, of the Fallulah Paper Company, Fitchburg, Mass., as president.

Wrapping Paper Manufacturers' Service Bureau

The Wrapping Paper Manufacturers' Service Bureau did not hold its annual meeting during the convention. A meeting was held, however, at which the discussion was confined to the internal affairs of the bureau, no officers being elected.

The Uehling Instrument Company, Paterson, New Jersey, has recently developed and placed on the market a new combined barometer and vacuum recorder primarily for determining (1) the absolute back pressure in steam turbine and condensing plants, (2) the barometric pressure, (3) the condenser vacuum, (4) the existence of air leakage into the condenser, etc., and (5) the ability of the condenser to handle the load.

One of the publications emanating from the Engineers' Club of Philadelphia, is a very complete treatise on the "Progress in Hydraulic Engineering." This very instructive book is issued with the compliments of Dominion Engineering Works, Ltd., Montreal, Canada.

A MARK OF CONFIDENCE

In 1890 the maximum output of a paper machine was 325 feet per minute.

By 1920 paper machines had established a record of 1000 feet per minute.

Thirty-five years ago the Appleton Machine Company began to build paper and pulp mill machinery. Our record of improvement and development of paper mill machinery has kept pace with the achievements of paper-makers.

Our trade-mark or name upon our machines is the mark of our confidence in their ability to do all that is required of them.

Jordans—Splitters—Flat Screens—Chippers—Wet Machines—Centrifugal Pumps —Etc.

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Designers and Builders of Paper Mill and Pulp Mill Machinery at
APPLETON, WISCONSIN

ESTABLISHED 1828

The

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We Design and Build **PAPER MAKING MACHINERY**

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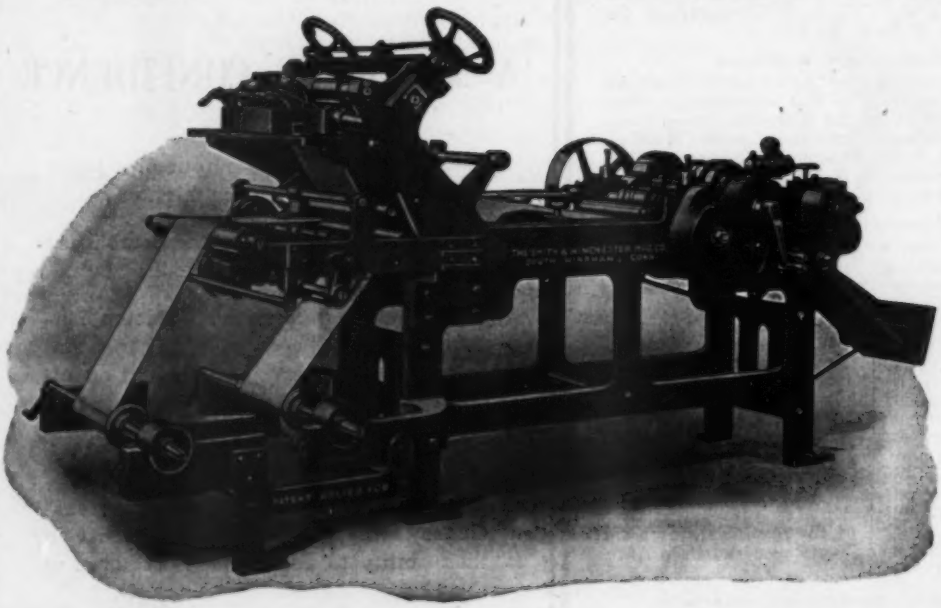

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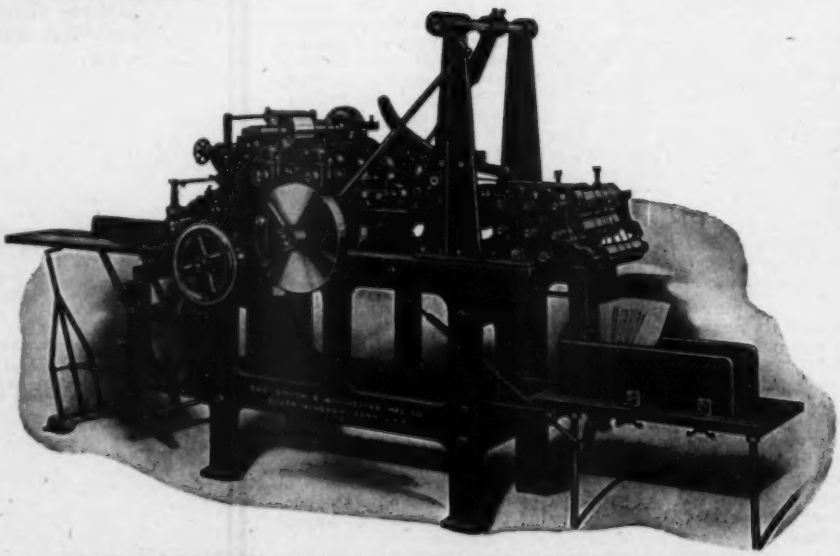

SMALL BOTTOMER WITH SEMI-AUTO FEED AND DELIVERY FOR DUPLEX BAGS

ACQUAINT US WITH YOUR REQUIREMENTS ESTIMATES CHEERFULLY SUBMITTED

New England

Boston, April 2, 1923.

Relief in Transportation Situation

Relief from acute railroad conditions is the one great improvement throughout this territory. Car shortages, coupled with excessive snow, produced a very low state of transportation service which was intensified by the poor condition of locomotives on the two largest New England roads. Delayed shipments became habitual during January and February, but happily this condition is becoming alleviated and with its passing the New England mills are enjoying one of the most healthy surges of business since the armistice.

Every department of the paper business is in good condition today and while it is thought that book paper, newsprint and board production may have reached and passed its peak, there is still room for improvement in the fine papers, and the mills in the Berkshire district are continually increasing their output, in line with this theory.

American Writing Paper Company, for example, again showed a deficit after fixed charges, but President Galliver is optimistic on the basis of the business he sees coming in. Most of the other fine paper mills in western Massachusetts in their annual reports, showed excellent earnings for the past year. Typical instances were the Valley Paper Company and the Southworth Company of Holyoke and Mittineague respectively. The Valley Paper Company showed accumulated surplus of $699,000 at the end of their fiscal year, while the Southworth Company had a surplus of $114,000.

Costs of all raw materials showed an upturn, with the exception of coal, during March. Notable cases were: roofing rags, which were up to $1.85 and $1.95 towards the end of the month; old white rags were considerably higher, selling at 8¼c up and shirt cuttings sold at 14c to 14½c. Coal was down from $10.50 to as low as $8.50 on cars Boston.

Boston Paper Trade Association Meets

The Boston Paper Trade Association held a very enjoyable meeting at the Algonquin Club, Boston, on Wednesday evening, March 21st. There were 101 mill men, jobbers and their guests present. A resolution favoring daylight saving was passed. This will be forwarded to the Governor of Massachusetts, the house and senate, and presidents in the legislature. Hon. W. W. Lufkin, Collector of the Port of Boston, spoke briefly on the importance of New England manufacturers using the port of Boston to export their goods as well as importing through this city, inasmuch as he despaired of holding the present position of second port in the nation unless ships were provided with outgoing freight.

Previous to Mr. Lufkin's address, President Raybold, of the American Pulp and Paper Association, delivered an address on the importance of trade association work for the salvation of American business.

The Fitchburg mill of the George W. Wheelwright Paper Company, better known as the Rollstone mill, which had been making book paper for coating mills until the business depression of 1921 and has since then been closed, has been segregated from the main business and will manufacture grease-proof and glassine papers. A new corporation to be known as the Rollstone Paper Company has been formed with $300,000 capital stock, of which the George W. Wheelwright Company will be the largest owner. The company, however, has secured the services of Mr. Louis T. Stevenson of the Mountain Mills Paper Company of Lee, Mass., who is thoroughly familiar with the manufacture of this class of paper. Mr. Stevenson will be president and manager of sales. Mr. George W. Wheelwright, Jr., informs us that the machine now in the mill can be utilized, though some supplementary machinery will be required.

Contracts have been placed for extensive improvements in the paper making plant of the Willimantic River Paper Company of South Coventry, Conn., with a view to beginning the manufacture of board there in the near future; probably by the middle of April. The plans include a new engine and boiler, a new water wheel, additional papermaking machinery and an addition to the main building. The plant was formerly the South Coventry Paper Mills, Inc., and went into the hands of a receiver on January 1, 1922. Under the purchase contract it was returned to the original owners on December 15 last. Counter, inner sole and chair seat board are the products.

A hot controversy was started in Maine by Governor Baxter of that State when he vetoed the bill which would grant a charter to the Kennebec Reservoir Company for the purpose

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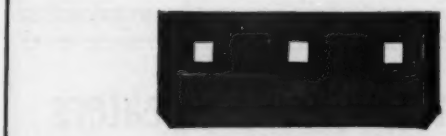
FOR
Paper and Pulp Mills



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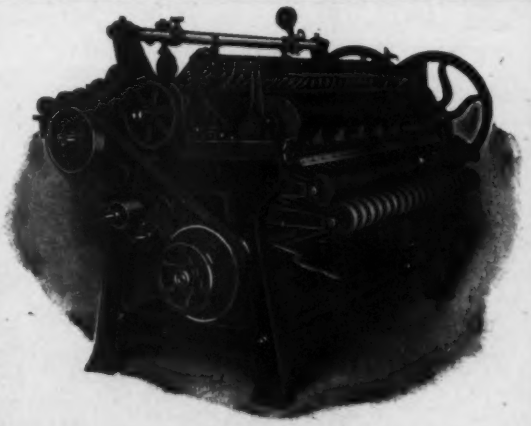

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Claflin Continuous Beaters

Now in use Demonstrate the fact that they will do BETTER BEATING, BRUSHING and REFINING, produce a STRONGER, SMOOTHER and MORE UNIFORM PULP than is possible with any other Beater. Whether run in tandem or singly in connection with regular Beating Engine, they are GLUTTONS in the amount of work they will do.

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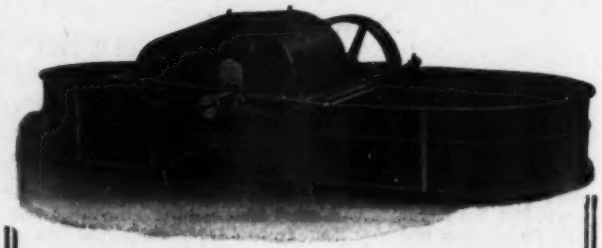

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PHILADELPHIA, PA.

of allowing that concern to build a huge dam on the Dead River, the largest tributary of the Kennebec River, to regulate the flow of water in the Kennebec and to double the power capacity of the stream. The Kennebec Reservoir Company is a combination of paper mill and power interests including the International Paper Company, the Great Northern Paper Company and the Hollingsworth & Whitney Company. The bill was finally passed over the Governor's veto and it looks as though the companies mentioned have a clear field for their project, despite the expressed intentions of the Governor to demand referendum on the bill.

By the time all new machinery is installed, the Uncas Paper Board Company, which is the old Iron Sides Board Company mill at Norwich, Conn., will have one of the largest capacities of any board mill in the country. The Pusey & Jones Company of Wilmington, Del., are making 35 new dryers for them which will be attached to the No. 1 machine and 35 extra dryers are being made in Downingtown, Pa., for the No. 2 machine. Five extra vats have also been ordered with full equipment for each of them. James E. Smith, the new president and owner of the mill, is optimistic, hoping to maintain full production with this new machinery at the rate of about 200 tons of all kinds of board per day. Years ago "Uncas Board" was the standard of paper board quality for the country.

The functions of a mechanical department and the duties of various engineers in a modern manufacturing plant were explained to members of the Mechanical Engineers' Club of Orono, Me., by R. P. Miller, production engineer of the Eastern Manufacturing Company. Taking his own plant as an example, Mr. Miller outlined the functions of the mechanical superintendent, advisory superintendent, production engineer, chief of stores, chief draftsman, and chief steam engineeer. He explained the bonus system employed at the Eastern's mills and outlined policies used in dealing with employees. He cited the following rules laid down to foremen at his mill: Produce results—buck passing doesn't go; tell people "why"; provide good environment for employees; don't lay men off without telling them the reason.

Morris F. Driscoll, one of the old time paper stock dealers of Boston, has merged his business with the D. DeStefano Company, Inc. The latter concern has offices and packing plant on Damrell Street, South Boston. Morris F. Driscoll has operated a packing plant on Milk Street, Boston, and it is understood this will continue as part of the business. There will be no change in the paper stock business otherwise, Dominik DeStefano continuing as president, Morris Driscoll to become vice president and William H. Brown remaining as treasurer. The company is a large factor and supplies important mills including a large percentage of the paper stock consumed by the Robert Gair mill at Haverhill, Mass.

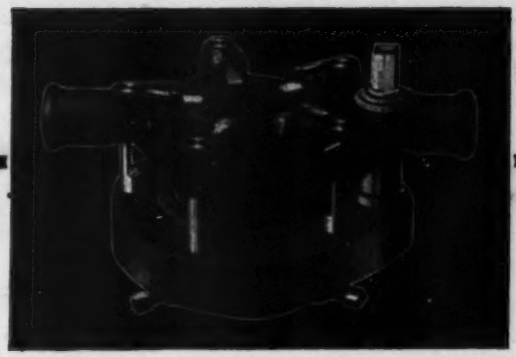
Removal of a huge amount of pulpwood owned by the Pejepscot Paper Company at Belfast, Me., to Bath, Me., is under way, but it will take three months to complete the job. This wood is received by boat from the Canadian provinces and is distributed to the company's various mills from the unloading terminals which have been moved to Bath. The company will have equipment to handle wood at Bath which is hoped to be more efficient than that formerly in use at the old terminal.

The Watson Frye Company, Ltd., of Bath, Me., has voted to apply to the courts for dissolution and has asked for the appointment of a receiver. The company did a general foundry business and has in the past made considerable paper making machinery for mills in northern New England. Recent contracts taken at a loss and the construction of a steel casting foundry, later abandoned, was given as the reason for this move.

The Berkshire Local Division of the Cost Association of the Paper Industry held a meeting at the Hotel Richmond, North Adams, Mass., at 3 P. M., on March 27. A dinner at 6 was enjoyed by the score of members who attended. Previous to the conference, H. B. Shaw, of the Berkshire Hills Paper Co. of Adams, conducted members through his mill.

The Robert Gair Company, paper board manufacturers, has leased part of the second floor at 161 Summer Street, Boston, and will install part of their offices there.

The state of Massachusetts will plant two million trees, largely spruce, this spring.



When You Think of Pipe Jobs Think of "TOLEDOS"

These two "Toledo" tools are particularly well adapted for use around the paper mill, for they will handle most of the larger piping jobs quickly, easily and right in position.

The No. 2 tool, shown above threads 2½ in. to 4 in. pipe, and the No. 250 pipe cutter, below, cuts off 2½ in. to 6 in. pipe.

Like all "Toledos" both tools may be operated by hand, anywhere the pipe is located or operated by the "Toledo" Power Drive, the electrical unit, converting the tools into the most efficient power equipment.

"Toledos" are made in various sizes to cut or thread any size of pipe up to 12 in. "Toledo" equipment can be relied upon to meet the most exacting requirements as thousands of owners will tell you.

A copy of complete catalogue will gladly be sent on request.

The "Toledo" Power Drive Makes "Toledos" Doubly Efficient

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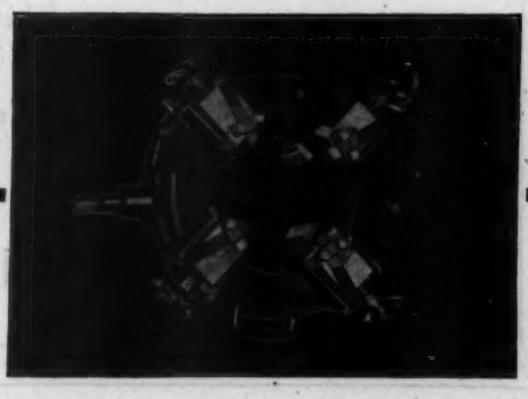
New York Office, 50 Church St.



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Bond and Kraft Papers

It is understood that the Eaton Dikemann Company, paper makers at Lee, Mass., has purchased what is known as the Daley stable property south of their Mousatonic mill and while making no statement as to their intentions it is believed they will sooner or later build a mill there.

Damage to machinery and material amounting to about $20,000 was caused by a fire in the pulp mill of the Eastern Manufacturing Company mill at Lincoln, Me. The fire spread through the dryer room and into the chip loft. The damage was confined to these two rooms.

Right up to the minute, the Worthy Paper Company lives up to its traditions by getting out a new line of paper this month called "Near Papyrus." This almost exactly resembles in appearance and texture writing paper of the time of King Tutankhamen.

The Strathmore Paper Company of Mittineague, Mass., filed an increase in capital stock from $11,100,000 to $11,500,000 by the issuance of 40,000 shares of employees' capital stock.

The Fall Mountain Pad and Paper Company, with a mill at Bellows Falls, Vermont, has been purchased by interests in Newton, Mass.

Miami Valley

Middletown, O., April 2, 1923.

Meeting of Miami Valley Superintendents

Three speakers, all Miami Valley men, addressed the March meeting of the Miami Valley Pulp & Paper Mill Superintendents' Association at the Hotel Manchester, Middletown, on March 31. The subject of "Waste in the Paper Industry," begun at the February meeting was continued with the following program:

G. S. Martindale, Works Engineer of The Champion Coated Paper Company, of Hamilton, discussed "Waste in the Generation of Steam."

William T. Schenck, of The Black-Clawson Company, Hamilton, had the subject: "Waste in the Finishing Room."

G. N. Randell, of The National Cash Register Company, Dayton, talked on "Waste in the Generation of Electricity."

Mr. Randell declared that the growth of the paper industry was largely due to the development of the use of power in the mills. He said that in many plants it is possible to realize a saving of twenty per cent by the use of power, and that in a company where the business is largely of a competitive nature, the saving possible through the use of power may be the factor that lies between success and failure.

Mr. Randell said that, although the executives in many companies are not easily influenced to change their methods, the power plant of the future will be controlled by electricity entirely.

In discussing "Waste in the Generation of Steam," Mr. G. S. Martindale brought out many interesting points. His paper will be published in a coming issue.

In discussing "Waste in the Finishing Room, William T. Schenck spoke in part as follows:

"One of the first items in a good finishing room is that there is ample room, light and ventilation, and that it is always kept clean. This inspires the employees to do good work. Dust should be eliminated. There should be exhaust fans at the top to eliminate dust as this is a great source of trouble in printing. The employees in this department should be selected. It takes good, clean, careful and intelligent employees in this department. Every one should be instructed as to his or her duties and be impressed with the idea that neatness and cleanliness are absolutely essential; also each employee should be made acquainted with the exact value in dollars and cents of the product he handles. Do not make the mistake of giving him this valuation in reams or tons, but in sheets and pounds. Many single sheets in some mills amount to from one-half cent to ten cents on the sheet. With the knowledge of this information an employee has the proper insight into the values he is handling.

"A word here to superintendents and other executives. If you go to the sorting or cutter tables to look at a sheet do not destroy the sheet after examining it but replace it, as the employee will invariably do as you do. If you tear it up and throw it on the floor he will do the same. No waste should be allowed on the floor at any time. It will be walked upon and soiled and eventually this dirt will find its way back into the paper.

"Instruct all employees in the necessity of keeping their

CONVICTIONS FROM THE CONVENTION

We were convinced, from personal contact and observation at the Convention—

That the B & P organization is most generally regarded, in all circles, as a paper merchandiser of integrity, resource and ability—

That the paper and paper products merchandised by the B & P organization are known to be uniformly accurate, appropriate and advantageously priced—

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As these good words expressing goodwill came from varied and various sources, our convention convictions seem to be well founded.

To those who may be seeking this sort of a paper service, we desire to demonstrate that we *do* live up to our convictions—conscientiously, carefully, continuously.

Our nearest office will please you promptly.

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machines free from oil and dust. Drives should be placed in the basement, if possible, and covered, as running belts create much dirt. Men should be allowed ample time to keep machinery clean. There should be provided ample wash bowls, soap and paper toweling for employees since much waste is made by soiling. This has a twofold meaning. It not only makes waste but goes back into your stock and makes dirty paper. Rubber splices should also be avoided as all splices go into waste and will come out in your paper again as dirt, and in many cases poor spots on your wire, causing costly shut-downs.

"Now to get down to the actual waste, how it occurs and how to avoid much of it. Roll boys on machines should be instructed to take rolls off the winder very carefully as many times it is allowed to roll out into the room, thus bursting the edges. Moreover, if wood or paper cores are used, the bump they get will make lopsided rolls, which will be difficult to get through the calenders or cutters. Rolls taken off the winders should all be wrapped. Soft end rolls coming off the machine are a great source of waste. It is almost impossible to run this kind of a roll through a super-calender and get some kind of a calender cut or wrinkle. To cut down waste on the super-calender the paper should be run through with as little tension as possible, both in holding back and winding.

"Another source of waste is from slipped rolls. Men will use clamps or nail sticks on edge and in many cases will spoil much paper. The slipping of rolls can be eliminated to a great extent. The proper way to start a roll is to have it absolutely tight on a shell.

"Paper should be measured at least once an hour and squared. Care should be taken by the operator when he puts up an end to look under the sheet at the bed knife to see that there are no pieces of paper hanging over the knife board. The cutter should be arranged to cut large quantities, say a stack about 40 inches high, and these should be removed in units of from 1,200 to 1,500 pounds.

"In cutting down loss in the finishing room, much depends on the example the foreman and superintendent set for the rest of the employees. If they are careless the men under them will be the same."

$1,500,000 Plant to be Erected

Announcement was made here today by The Paul A. Sorg Paper Company of the contemplated construction of a new paper mill, with a capital stock of $1,500,000, to be known as The Frank Smith Paper Company. With the completion of the new plant, the Sorg Company will have four subsidiary companies, including The W. B. Oglesby Paper Company, of Middletown, The Empire Paper Company, of Ithaca, N. Y. and The Carso Paper Company, of Danville, N. Y.

The new plant will be located in a building 500 feet long and 200 feet wide and is to be built on property adjoining the Oglesby mill facing First street. When in full operation it is expected to give employment to 200 men. Directors said today that the contracts may soon be awarded and they hope to begin actual construction during the summer.

As a part of the scheme of improvement, a huge power plant may be constructed. The unit plan of the Sorg interests is so arranged that the entire combination of buildings making up the Sorg, Oglesby and proposed Smith companies may be operated by one central power plant. The power plant plan is as yet tentative, however, and later developments are awaited before the company will consider going ahead with this feature.

The new Smith mill will operate two machines. This will give the various Sorg mills ten machines, of the flexible type, enabling the manufacture of 200 different grades of paper. Officials of the company say that this is the secret to the fact that the Sorg mills are never idle and never experience slack business, because when one product is not in demand the many machines are turned to manufacturing a product for which there is a market.

Following the policy of the Sorg Company, each of the subsidiary companies is separately incorporated and operated as a distinct unit. The unit plan is so developed that all companies can co-operate in every advantageous way.

Frank Smith, for whom the new company is to be named, has been general superintendent of the Sorg and Oglesby mills for several years and also is vice president of the Paul A. Sorg Company. He is reckoned to be one of the leading paper making experts in the country.

J. A. Aull, president of The Paul A. Sorg Paper Company, Frank Smith, superintendent, and Donald G. Driscoll, Mr. Aull's son-in-law, also connected with the company, will leave Middletown the middle of May for a foreign tour. The wives of Mr. Aull and Mr. Driscoll also will make the trip. They will make an inspection of paper mills in France and Central Europe.

The Glatfelter Mills

AT SPRING GROVE, PA.

With a daily capacity of 90,000 lbs. of Soda Pulp and 200,000 lbs. of Paper is one of the most modern mills in the country, with a product uniformly satisfactory.

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Fox River Valley

Green Bay, Wis., April 2, 1923.

The Northern Paper Mills Busy

The Northern Paper mills of Green Bay will continue to operate at capacity with a policy of storage during slack seasons, according to Judson G. Rosebush, general manager, who has just returned from a trip through the West. Mr. Rosebush's trip has convinced him that conditions in the paper trade are certain to continue to improve and he was most optimistic as to sales conditions in California and other western states.

The Northern Paper mills are decreasing their stock of manufactured paper on hand as a result of these better sales conditions, and this in spite of greatly increased production as compared with last year. Six paper machines are operated by the company and have been speeded up and kept going at capacity for many months.

During the last year, when the company was being operated at capacity, it was known that a stock of paper was being accumulated which made it necessary to lease outside storage space when the plant warehouse was filled. From some sources came expressions which indicated there were some doubts as to the wisdom of this course, but Mr. Rosebush's statement that the company is decreasing its stock would seem to indicate that he had the market figured correctly and this is borne out by the announcement that this policy is to be continued.

The policy of storing paper is not new or novel, according to Mr. Rosebush. It can not be followed, he pointed out, where paper is manufactured to order, but is possible where large mill brands are made.

The increase in production at Northern is the result of improvements in plant and equipment, running into hundreds of thousands of dollars, that have been made during the last year. Alterations in machines and rearrangements have been made without any appreciable reduction in output, only one machine at a time being shut down over week-ends.

Sales conditions with the Northern mills began to show improvement last summer and with the exception of the customary slump around the holidays, sales have been on the upward trend since. February sales and shipments showed a considerable increase over January.

Reduction in Freight Rates

Paper manufacturers of this section have been advised by the Green Bay Association of Commerce traffic department of what amounts to practically a reduction of 25 cents per hundredweight on freight rates on paper and paper products from Green Bay and this territory to Pacific coast points and the mountain territory. The new rates will become effective on April 17, it is announced.

Tariffs have been received quoting the rates to the northern section of the territory. These show the rates from Green Bay to the West will be reduced on towels, napkins, tablets and wrapping paper in carloads of 40,000 pounds minimum weight from $1.58 to $1.35. Rates on 26,000 pound cars either straight or mixed will be reduced from $1.75 to $1.35. On straight cars of these articles the rate is reduced on 40,000 pound cars from $1.45 to $1.35, and on straight cars of 26,000 pound minimum the new rate is $1.35 compared with $1.58.

George J. Lenz, superintendent of the Hoberg Paper and Fibre Company, is the originator of a new safety collar for paper mill machines, on which he has just been granted a patent after two years of experimenting. It is claimed by the inventor to be a great improvement over the old style set screw collar. It slides on the shaft and a quarter turn of the screw will loosen it. Another advantage claimed for it is that it will not bur or mar the shaft. Between 25 and 30 of the collars are in use in the Hoberg mills and 200 more are in process of manufacture. They are said to be especially desirable on the large paper machines to hold the cores in place.

Experiments are being made in the Forest Products Laboratory at Madison with 150 pounds of macerated currency which, before it was cut up, represented approximately $2,500,000. The first run of paper made from the currency pulp contained so many foreign particles it was not of high grade but with a cleaner product, the later runs have been more promising. The reclamation of this pulp is said to be of importance as from two to three tons of pulp are macerated daily at the treasury department, it is said.

The Green Bay Paper Napkin Company, recently reorganized, is now operating, with new capital added and under

New Sand Filter

A SPECIAL filter for paper mills, producing all the results the paper manufacturer desires. It is a modification of the well known Hungerford filter adapted to paper mill use. It is constructed of concrete, strictly wrought iron pipe, brass strainers and especially prepared silica sand. It is as durable and efficient as can be built at any cost. It can be sold at a very low figure.

This filter gives perfectly clear water, washes thoroughly, does not require renewal of the sand bed, is absolutely reliable in the performance of its duty and requires a minimum amount of attention.

Send for full particulars

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WATER
Filters and Softeners

The new **PAIGE-JONES** pressure sand filters, designed for paper mill use, embody the most approved features of construction, insuring a water clean and clear for manufacturing purposes.

PAIGE-JONES water softeners permit the correct **INTERNAL** or **EXTERNAL** treatment of boiler water as the individual case demands.

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SAVEALL will make any old roof weatherproof and water tight for less than one-fourth the cost of a new roof. We will ship you all the SAVE-ALL you need to go over all your roofs, one barrel—or a carload, with an unqualified guarantee of satisfactory results or you pay nothing. Write for our low Freight Paid prices and complete information on

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We also manufacture a complete line of exterior and interior paints. Write for information on Cold Water, Mill White and Cement Floor Paints.

The Franklin Paint Co.

Main Office and Works

CLEVELAND OHIO

new management. Byron L. Walter of Green Bay is president and P. J. Christman, Jr., is general manager and secretary. Flat and folded napkins are being made and the company is optimistic as to its prospects, having enough orders on hand to keep it going at capacity for several weeks. A new high speed napkin folding machine designed by Mr. Christman and J. J. DeLoye is making production at high speed possible.

The Consolidated Water Power and Paper Company has recruited a force of men for construction work at its Byron plant where a new building is to be erected for the new paper machine recently ordered.

Foremen and superintendents of the Nekoosa-Edwards Paper Company last week had a dinner at Nekoosa after which mill problems were discussed at a round table meeting.

At Niagara, Wis., the Kimberly-Clark Company is constructing ten new houses for employees, the first to be ready for occupancy within two months.

Personals

On April 2, Emmett Hay Naylor, who is secretary of the Writing, Cover and Tissue Paper Manufacturers' Associations, with headquarters in New York City, ceased to be secretary and treasurer of the Book Paper Manufacturers' Association. Three years ago Mr. Naylor was retained by the book paper manufacturers to organize and start for them an association similar to that maintained for a good many years by writing paper manufacturers. Mr. Naylor undertook this work temporarily until the organization and statistical service was established, and last April at the annual meeting asked to be relieved of his duties owing to increasing work for his other associations, but was persuaded to continue as secretary and treasurer of the book paper association until this April. A successor to Mr. Naylor will be elected in the near future; possibly at their meeting which is to be held on May 3.

At a meeting of the New York Paper Trade Association on March 22 at the Hotel Lafayette, the following officers were elected for the ensuing year: President, J. C. Mallalieu, of George W. Millar & Company; Vice President, K. W. Warner, of John F. Sarle & Company; Treasurer, A. C. Damon, of Paul E. Vernon & Company; Secretary, Maurice O'Meara, of the Maurice O'Meara Company, and Assistant Secretary, William C. Ridgway.

R. H. Fischel, formerly president of the Fischel Paper Company of Albany, N. Y., at one time with the F. A. Flinn Company, Inc., of New York City, has joined the sales force of George W. Millar & Company, paper dealers of New York. Mr. Fischel has taken charge of the fine paper department of the Millar company.

H. F. Bullard, formerly purchasing agent of the Laurentide Company, Ltd., Grand Mere, P. Q., is now general manager of the Dryden Paper Company, Ltd., Dryden, Ont. Mr. Bullard took charge of his new position on April 2. H. S. Warren succeeds him as purchasing agent of the Laurentide Company, Ltd.

Ezra Levin, formerly connected with the bureau of agricultural development, has recently been employed by the Kalamazoo Vegetable Parchment Company. Mr. Levin's work will be to demonstrate to vegetable and fruit packers proper methods of packing and wrapping their products in wax paper.

Fred Baker, paper mill agent, has moved from 34 West Twenty-eighth Street to larger office quarters at 26 East Twenty-second Street, New York City. Mr. Baker is planning to leave shortly for a trip to Europe, visiting Sweden and Germany, to be gone about three months.

R. F. Hammond, Inc., of 342 Madison Avenue, New York, has been appointed exclusive sales agent for the Scottsville Paper Box Board Corporation, of Scottsville, N. Y., manufacturers of double and single lined manila and solid manila boards and board specialties.

A. R. Melker, of 110 East Forty-second Street, New York, has been appointed eastern sales representative for the J. P. Lewis Company, of Beaver Falls, N. Y., manufacturers of patent coated boards, index card, post card, bogus, bristol and board specialties.

FOR SALE
Wood Pulp Grinders

We have in stock for immediate delivery at a reasonable price four new 3 pocket, 16″ cylinder, 27″ x 54″ stone, 8″ spindle, taper bushed steel flange, IMPROVED DAYTON WOOD PULP GRINDERS. These grinders are from a lot of twelve built for a Canadian concern now in the Receiver's hands.

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Send for specifications, photo and price or send representative

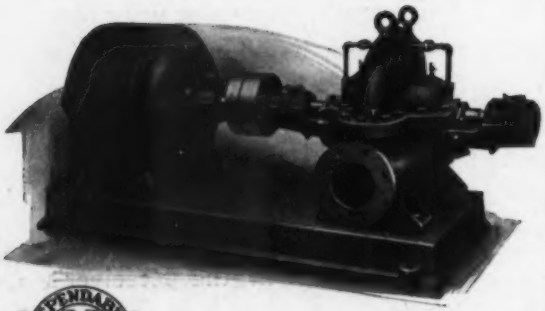
Technical Association Papers, Fifth Series

This volume of 176 pages is one of the most valuable contributions to the literature of pulp and paper manufacture yet issued. The contents include the following articles besides a directory of the officers and members of the Technical Association and the list of committees:

The Power Plant of the Paper Industry, by A. G. Darling and H. W. Rogers.
A System of Records to Maintain Uniformity of Basis Weights of Paper, by Parker K. Baird.
Hydrating Machinery for the Paper Mill, by George L. Bidwell.
Modern Lighting for Paper and Pulp Mills, by J. H. Kurlander.
Some Factors Influencing Yield and Strength of Pulp Cooked by the Soda Process, by Martin L. Griffin.
Sedimentation Control of Groundwood, by W. A. Munro.
The Efficient Production of Mechanical Pulp, by Adolph F. Meyer.
The Drying of Paper, by M. B. Littlefield.
The Electric Steam Generator, by Horace Drever and Frank Hodson.
Recovery and Its Control, by George K. Spence.
Relative Efficiency of the Automatic Magazine Griader as Compared with the Pocket Type Grinder, by John J. Case.
Stamse—Cotton Linter Pulp, by Stewart E. Seaman.
Analysis of Reclaimed Cooking Acid for Sulphite Mills, by Gösta P. Genberg.
Analysis of the Raw Sulphite Acid, by Dr. Rudol Sieber.
Concerning Lignin and Lignin Reactions.
Contribution to the Knowledge of the Constitution of Spruce Wood Lignin.
Contributions to a More Exact Knowledge of the Chemical Constitution of Spruce Wood. Three articles by Dr. Peter Klason, translated by W. E. B. Baker and Carl L. Fineman, by special permission of the author.
Use of the Continuous Centrifugal, by J. R. Kessler and G. N. Collins.
The Chemistry of the Sulphite Process, by R. N. Miller and W. H. Swanson.
Standard Methods of Testing Materials, by N. F. Becker.
Color Effect of Rosin Size Emulsion on Finished Product, by C. H. Kent.
Sulphur in Sulphite Waste Liquor, by George Barsky.
Producing Bleach Liquor with Liquid Chlorine, by S. W. Jacobs and H. P. Wells.
A New Idea in Chip Breaking, by A. D. Wood.
Fuel Economizers in Paper Mill Operations, by George E. Williamson and G. C. Derry.
A New Idea in Chip Breaking, by A. D. Wood.
Bibliography of Paper Making for 1921, by Clarence J. West.
Proceedings of the Annual Meeting, April, 1922.
Sectional Meeting on Dyestuffs.
Sectional Meeting on Paper Testing.
Sectional Meeting on the Drying of Paper.
Discussion of Various Papers Presented at the Convention.

The volume described is obtainable, on order, from the Technical Association of the Pulp and Paper Industry, 18 East 41st Street, New York City, at $3.00 per copy.

MIDWEST TURBINES AND PUMPS



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IN paper mill service, where ruggedness, dependability and economy are the most important factors, you will find Midwest-Hill equipment in daily operation.

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This very same reasoning applies to power transmission belting. Belting made to be used in a planing mill, for instance, will not render satisfactory service under the peculiar atmospheric and mechanical conditions found in any paper mill.

Republic Double Cross Belts are designed especially for paper mill work. In them you will find those wear and damp resisting qualities which are absolutely essential to belting designed for this particular line of business.

To realize the greatest potential efficiency of your plant specify Republic Belting.

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YOUNGSTOWN, OHIO

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REPUBLIC BELTING

Bernard Sharp, president of the Great Eastern Paper Company, of New York City, recently enjoyed a combination business and pleasure trip to Cuba. Mr. Sharp reported on his return that conditions in the paper trade in Cuba are approaching normal.

Fred H. Fuller of Watertown, N. Y., has been engaged as superintendent for the new paper mill of the Kalamazoo Vegetable Parchment Company. Mr. Fuller is the inventor of the Tompkins, Hawley, Fuller top felt arrangement for paper machines.

Louis H. Bigelow, who for nineteen years has been with the Seaman Paper Company, Chicago, has resigned as secretary and director. Frank A. Borchers has been elected vice-president and secretary of the company.

Clifford F. Messinger, for the past three years general sales manager of the Chain Belt Company, Milwaukee, has recently been elected second vice-president of the company, according to announcement just received.

Due to poor health, William Thomas, superintendent of the Michigan Paper Company, Plainwell, Mich., has been given a six months' leave of absence.

Obituaries

Frederick G. Crane

Another of the famous family of papermakers in Dalton, Mass., has passed on, this time it was the active head of the mills, Mr. Frederick G. Crane, cousin of the late Senator W. Murray Crane of Massachusetts. Mr. Crane died suddenly on March 15 of heart trouble. He was 56 years of age, was president of Crane & Co., and head of the Crane Brothers Mill in Westfield, Mass., and a director of Eaton Crane & Pike, paper makers of Berkshire county. He was philanthropic, maintaining the best traditions of his family. He was interested in livestock raising and had a model farm of 3,000 acres which was one of the largest in New England. Here he raised herds of famous Guernseys and pure bred Belgian horses. He leaves his widow, Mrs. Rose Crane, a son, Frederick G. Crane, Jr., a daughter, a sister and half sister. His interests in the paper mills were left to his son, his other property to his wife and money to public institutions.

Succeeding him as head of these great paper interests that "make the bank note paper for 22 nations, the paper money for 18 nations and 438,000,000 people" is Winthrop M. Crane, son of the late Senator, who will have associated with him Frederick G. Crane. The new chief of the great Crane interests has worked in the mills from the time he left college. He is 43 years of age today and has filled almost every post of importance in the business. He is described as being much like his eminent father in his fairness, his sound judgment and mental acumen. He is married and has a daughter and two sons.

Charles A. Woodcock

Another well-known mill man who passed on this month was Charles A. Woodcock, manager of the paper mill department of Finch, Pruyn & Co. at Glen Falls, Me. His death occurred in Montreal at the home of his brother-in-law. He was an exceedingly hard worker and it was overwork which is said to have brought on his death. He was considered an authority on every phase of paper making, having studied the subject in its entirety.

George C. Bayless

George C. Bayless, president of the Bayless Pulp and Paper Mills, of Austin, Pa., died at his home March 3. Death followed but a brief illness and was very much of a shock to his numerous friends in the industry. Mr. Bayless was sixty years of age at the time of his death and is survived by his wife, a son, Stanley, a brother, Franklyn J., and a sister, Mrs. S. Richard Davis.

Louis C. Schueing

Louis C. Schueing who has for years held office in the National Papeterie Company of Springfield died in that city on March 14 of pneumonia. He was well-known in paper making circles. He was 71 years of age.

A. F. Callahan

A. F. Callahan, president of the Outlook Envelope Company, Chicago, and inventor of the "window" envelope, died in St. Augustine, Fla., March 26.

Aurora Centrifugal Pumps

Type OMD

Aurora pumps are made in many types, to meet all conditions found in the paper mill field.

We specialize in horizontally and vertically split open and inclosed impeller, single and multi-stage and deep well turbine centrifugal pumps as well as deep well reciprocating pumps.

A card from you stating your conditions places our engineers at your service and results in a saving to you.

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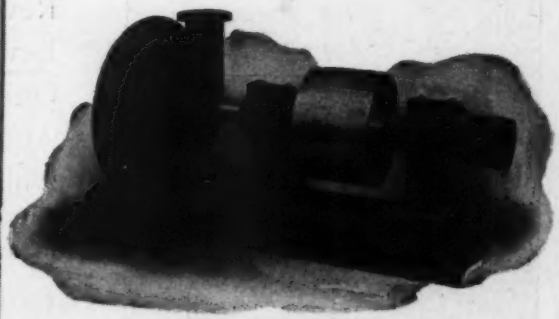

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Once upon a time a man bought a ten thousand dollar automobile, and after using it for a couple of weeks he put it in the garage and said—that's a great car—I wish I could afford to buy enough gas to run it.

PERHAPS you have a machine room ventilating system—well laid out—efficient and amply large—but when the weather gets down to zero or below and it eats up the steam till you think the head of the boiler is gone you just can't afford to feed enough steam into it to keep it going. Do you realize there is enough vapor going out of your machine stack to supply most of this heat instead of using steam? A **"Briner" Economizer** (patented) will enable you to utilize this waste heat. We would be glad to give you full particulars.

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Ability to lower on hoisting spindle as well as quick speed
Cut Gears
Ball bearing wheels
Rugged construction throughout

Electric machines have regular hoist type motor, line switch, reversing controller, upper and lower limits, heavy silent chain drive.

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NEW JERSEY FOUNDRY & MACHINE CO., 90 West St., New York City

William F. Sheahan

William F. Sheahan, a well-known paper maker of the Pacific Coast territory, died March 13.

Nicely Entertains Michigan Superintendents

Members of the Michigan Division of the American Pulp and Paper Mill Superintendents Association held their regular monthly meeting at Hotel La Salle, South Bend, Ind., on March 17, 1923. All were guests of Mr. Claud E. Nicely.

Ever since the January meeting, at which time Mr. Nicely extended his invitation to the superintendents of Michigan, this meeting in South Bend was looked forward to with pleasant anticipation, whetted with recollections of the enjoyable time shown them by Mr. Nicely a year ago. At the close of the meeting the loudly expressed concensus of opinion indicated that this year's event was, if anything, a bigger, more enjoyable event than the one of last year.

The meeting was called to order by Chairman N. M. Brisbois about 3:30 p. m. With but few prefatory remarks, the program of the meeting was taken up at once. Mr. W. S. Rooney of the Albany Felt Company, was the first speaker. Mr. Rooney gave his illustrated talk on the manufacture of felts. This talk has now been given before most of the divisions of the superintendents' association and everywhere it has been received with a great deal of interest. In his introductory remarks Mr. Rooney mentioned that through his recent contacts with the superintendents he had been able to learn a great deal about paper making which had proven both interesting and helpful to him. Following his talks numerous questions were asked. One of the very interesting discussions, which resulted from questions, was regarding the bearings for press rolls. One member said he had been experimenting in trying to find the best bearing, and the most efficient form of lubrication. While he does not feel that his experiments are necessarily conclusive, he discovered, nevertheless, that through the use of ball bearings and the substitution of oil in place of grease as a lubricant, he added from 7 to 9 days to the life of his felts.

The relative wear of wood, stone or rubber covered press rolls on the felt was also discussed to some extent. Some of the superintendents had little or no use for wood rolls, while others preferred wood to either stone or rubber covered. The only evident conclusion reached on this question was to the effect that every mill and every superintendent must work out their own salvation regarding this matter.

Mr. Rooney next gave an illustrated account of his trip to Japan. This was in a somewhat lighter vein than was his talk on felts and furnished a very agreeable diversion.

National President Gives Talk

Mr. John O'Connell, national president, who had arrived as a surprise, then took the floor and gave a short impromptu talk. After expressing his keen pleasure in being "back home," Mr. O'Connell mentioned the many accomplishments of the association during the past year. He gave much credit to Mr. Coughlin and others of his associates whom, he stated, were responsible for the majority of this work. He also urged the members of the Michigan Division to attend the national conventioon which this year will be held in Springfield, Mass., May 31, June 1 and 2.

The last speaker in the afternoon was Mr. F. C. Farnsworth. Mr. Farnsworth read a paper on "Drying More and Better Paper With Less Fuel," which paper will be found elsewhere in this issue.

The banquet in the evening was, to say the least, a very lively affair. Mr. Nicely had engaged professional entertainers who had a line of song and dance that for the moment drove all thoughts of work and toil from the minds of those present. Such diversion was indeed welcome after the afternoon spent in the study of weightier problems in the life of a superintendent.

A unanimous and very hearty expression of thanks to Mr. Nicely furnished an appropriate close to the day.

Those Present

George Davis, Jake Kuss, Frank Johnson, Ed Coughlin, W. B. Rappley and George H. Pountain of the Allied Paper Mills, Kalamazoo; C. E. Nicely, E. Wolfe, Charles MacAlpine, and Mr. Rosenberger of the La Salle Paper Company, South Bend; F. C. Farnsworth, Mr. Lewis and Mr. Evans of the Farnsworth Company, Norristown, Pa.; W. S. Rooney, and E. R. MacLaren of the Albany Felt Company, Albany, N. Y.; Alfred Bryant and E. H. Gilman of the Bryant Paper Company, Kalamazoo; J. J. O'Connell, Diana Paper Company, Harrisville, N. Y.; C. Harter, Rex Paper Company, Kalamazoo; N. M. Brisbois, Southerland Paper Company, Kalamazoo; J. E. Loughead, Western Paper Mills Supply, Kalamazoo; Luce Miller, South Bend; John Cornell, The Paper Mill and Wood Pulp News, New York City; Mr. Cornell, Cornell Belting

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Nice thing about the Godfrey — it places your coal where you want it—in bins, boiler room or outside storage. The entire handling cost is from 5 to 7 cents per ton and one man does all the work.
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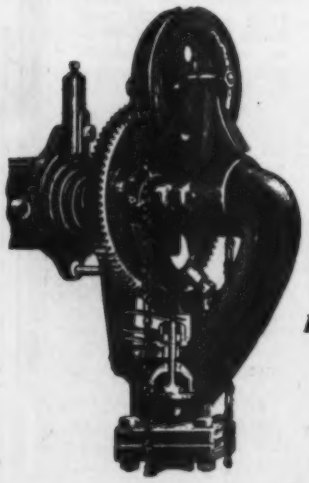

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The Best Paying Investment in the Boiler Room

Because:

They save 4 to 8 per cent fuel—one carload out of every twelve to twenty-five which enter your yard.

They save steam and labor, and labor turnover. The dollars and cents value of these savings alone in one year is more than the initial cost of the soot blowers.

They completely solve the soot blower problem. Satisfactory operation under the severest furnace conditions is at all times assured. Soot blower maintenance is reduced to a minimum.

Dollar for dollar invested the net savings effected by their use amounts to more money each year than can be earned by any other single piece of boiler or engine room equipment.

REMEMBER there is only one "Valv-in-Head" soot blower—the DIAMOND—and that the blower elements are protected by a special process developed by the General Electric research laboratories—CALORIZING. A booklet which belongs in the library of every executive who is concerned with the cost of power production is yours for the asking.

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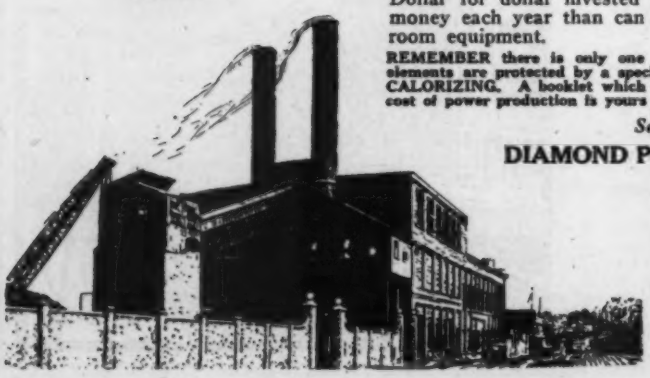

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Company, Chicago; Mr. Cahoon, B. F. Sturtavent Company, Chicago; Barney Benson, Williams Gray Company, Chicago; Harry Urick, Mac Sim Bar Paper Company, Otsego, Mich.; Jake Parent, Western Board & Paper Company, Kalamazoo; C. J. Frye, Lincoln Mills, Elkhart, Ind.; Oliver Buswell, The Paper Industry, Chicago.

New Line of Air Compressors

The Ingersoll-Rand Company, 11 Broadway, New York, announces a new line of small vertical belt driven air compressors known as Type Fifteen. In addition to the plain belt drive design (Fig. 1) each size is built as a self-contained electric motor outfit, driven through pinion and internal gears as shown in Fig. 2, or by employing the short belt drive arrangement. The compressing end and electric motor of both

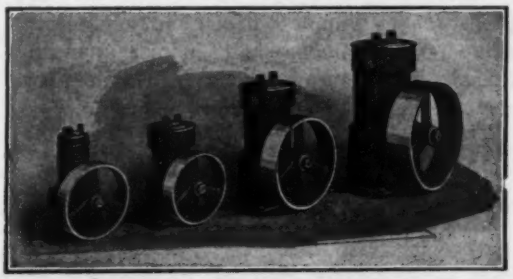


Fig. 1—The family of Type 15 Vertical Belt Driven Air Compressors, showing the 3" x 3" air cooled, the 3" x 3", 3½" x 4" and 4½" x 5" water reservoir cooled machines

gear and short belt drive units are furnished mounted on a common sub-base, so that they are in no way dependent upon the foundation for correct alignment.

Several noteworthy features of construction have been incorporated, of which the "Constant-Level" Lubrication System is the most important. Others include the Constant Speed Unloader for plain belt drive machines; the Centrifugal Unloader for start and stop control machines, and the increased size of the water reservoir cooling pot.

The lubrication of small vertical compressors employing the enclosed crank case and splash system has often been a source of concern wherever oil in the air is a serious menace. The tendency of the old system has been to feed too much, resulting in discharged air containing excess oil, or too little,

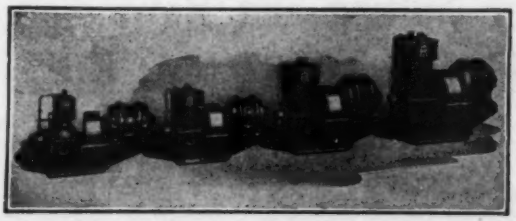


Fig. 2—The family of Type 15 Vertical Electrically Gear Driven Air Compressors, showing the 3" x 3" air cooled, the 3" x 3", 3½" x 4" and 4½" x 5" water reservoir cooled machines

causing scored cylinders, excess loads and burned-out bearings.

The "Constant-Level" system used in Type Fifteen Compressors automatically maintains a constant-level of oil, which insures the right amount being distributed to all parts.

As with the ordinary splash system, the base of the compressor forms an oil reservoir for the "Constant-Level" System. However, with this system, pet cocks determine the maximum and minimum amount of oil in the reservoir. Above this reservoir and directly underneath the connecting rod is a constant-level pan. Oil is pumped from the reservoir into this constant-level pan through a unique oil pump. Regardless of the amount of oil in the reservoir, so long as it is somewhere between the high and low level pet cocks, this system will function perfectly, insuring a constant-level of oil in the pan. A projecting stem on the connecting rod dips into this pan and distributes just a sufficient quantity of oil for proper lubrication.

The Constant Speed Unloader controls the unloading of the compressor by automatically opening the inlet valve when the receiver pressure rises above that at which the unloader is set to operate. When the receiver pressure has fallen a predetermined amount, the unloader automatically releases the inlet valve and allows the compressor to return to work and thus build up the receiver pressure again.

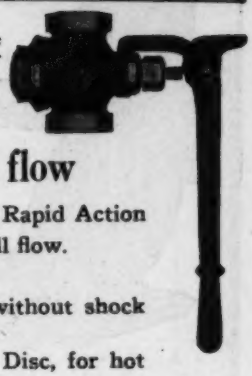
The Centrifugal Unloader allows the compressor to start

Made for maximum service not merely the average

TRADE JENKINS MARK

Jenkins Bros

Fig. 720, Jenkins Bornze Rapid Action Valve



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One pull of lever and a Jenkins Rapid Action Valve gives an instantaneous, full flow.

It stays open automatically.

Closed by slight pull of lever without shock or water hammer.

Fitted with Jenkins Renewable Disc, for hot or cold water.

Valve is made of bronze with malleable iron lever, enameled green. This valve not only saves time, but stops water waste. For use on lines and at places where a full volume of water is required quickly and often.

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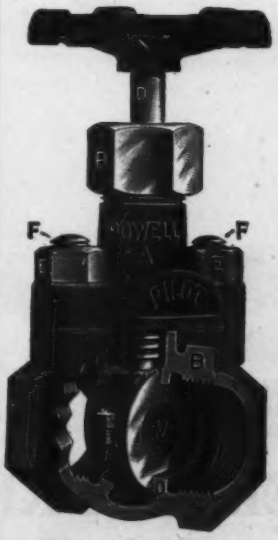

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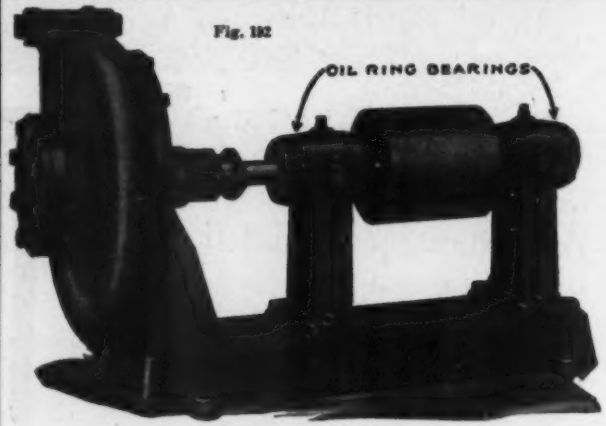

Fig. 192

TABER PUMPS

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FOR OVER 40 years we have been building various types of pumps to meet the particular needs of the service in which they are used. Taber Pumps reflect quality materials, skilled workmanship and infinite pumping knowledge put into their making, in the satisfactory service they give in operation.

Fig. 192 illustrates Taber "V" Type Open Impeller Pump built with double pedestal oil ring bearing for heavy duty. There is also an auxiliary bearing within the pump proper. These pumps are also made of special bronze for motor or belt drive.

Fig. 505 illustrates Taber "SV" Type Double Suction Centrifugal built in various sizes.

Submit your pumping problems to us for solution.

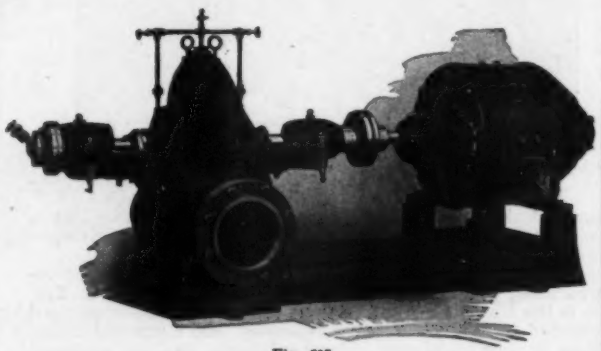
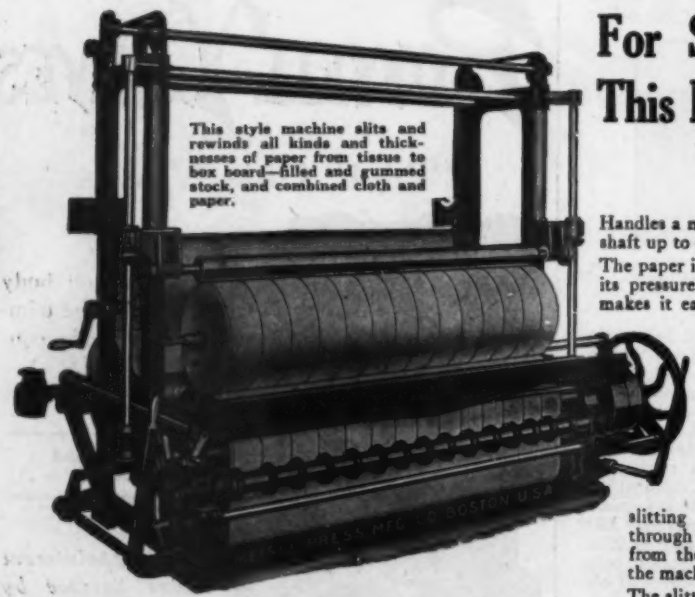


Fig. 505

TABER PUMP CO., Buffalo, N.Y.

Pump Specialists

Builders of Centrifugal and Rotary Pumps


This style machine slits and rewinds all kinds and thicknesses of paper from tissue to box board—filled and gummed stock, and combined cloth and paper.

For Slitting and Rewinding This Is the BEST MACHINE Made

Handles a mill roll up to 40 inch diameter and rewinds on one shaft up to 40 inch in diameter.

The paper is rewound by the use of three rolls; the top roll by its pressure gives compactness to the rewound paper roll and makes it easy to handle the poorest grades of paper without breaking. That serious defect in some machines arising from a one-side drive for the top pressure roll is wholly overcome by our double drive which gives uniform bearing on the rewound roll. This top pressure roll is easily and quickly raised for changing the roll by turning a crank. Counterweights can be increased or decreased in weight according to requirements.

Another prominent feature of this machine is its convenience. It has a device for separating the slitting cutter shafts to facilitate threading the paper through the machine. All adjustments necessary are made from the operator's place which is at the rewinding end of the machine.

The slitting cutters which are on parallel shafts give a clean, shear cut. The cutters may be quickly adjusted to different widths from 1¼ inch upward, and are clamped to the shafts with ample bearing surface so that they always run perfectly true.

MEISEL PRESS MFG. CO.

944 Dorchester Ave. BOSTON 25, MASS.

under "no load" such as is essential when automatic start and stop control is used, and permits the electric driving motor to come up to full speed before the load is thrown on automatically. This unloader accomplishes its purpose by holding the inlet valve open until the motor has reached full speed.

The smallest size is built with either ribbed cylinder for air cooling, where the service is intermittent, or a water-jacketed cylinder of the reservoir type for constant service. All other sizes are only built with the water jacket of the reservoir type. The size of these reservoir pots is very generous, and one filling will be found sufficient for long periods of operation.

A descriptive bulletin has been issued on these compressors which describes in detail all their features, including others not mentioned above.

Le Papier Announces Change

American trade papers by no means have a monopoly on constructive progress. Following is an extract of a letter from what has been termed "*The Paper Industry* of France," Le Papier:

"In 1918, various persons deplored the scarcity of our technical paper literature. We wished to bring an end to this reproach, and at the cost of great sacrifices, we have transformed the old journal "Le Papier" founded in 1898 by Mr. Everling.

"In 1923, we wish to improve our review still further, and various modifications will make of it a publication indispensable to the paper manufacturers. To permit its easier development, we have entrusted its editing to Mr. Ruby, Chemical Engineer, Engineer of the Paper School of Grenoble. There, in that institute, in the center of the most flourishing region of France for the paper industry, we can find in the plants a wider field for study. We hope that under these conditions, with the aid of our collaborators, we can give a new impulse to Le Papier."

New Sales Manager for Peshtigo Paper Co.

The Peshtigo Paper Co., Peshtigo, Wis., announces the appointment of L. R. Spencer as sales manager. The product of the company has been in the hands of The Mead Sales Co., Chicago, but the sales office has been transferred to the mill, and hereafter will be under the direction of Mr. Spencer. Future mail inquiries should be addressed to Peshtigo.

The entire output of the Peshtigo mill will be bleached sulphite papers in machine glazed and machine finish, and they will specialize in waxing papers and bleached whites for conversion purposes. Their sulphite mill is being remodeled with the idea of producing the pulp requisite for their needs, and a high standard and uniformity are assured.

The Warren Manufacturing Company have just placed an order with Rice, Barton & Fales, Incorporated, Worcester, Mass., for a 124-inch Fourdrinier machine which is to be installed in their Milford, N. J., mill. This machine, which is practically a duplicate of the one furnished by the same builders in 1919, is to turn out the well known line of Glassine papers as made by the Warren Manufacturing Company, and is to be designed and constructed with all of the latest and most improved devices for the manufacture of this special kind of paper. Delivery of the new machine is to be made during the coming summer, and will add greatly to the Warren Manufacturing's capacity for making glassine papers.

A new concern in the paper jobbing trade of New York City is the Paper Supply Company, which is located at 261 Canal Street and which was organized by H. A. Earle, well known in the trade through his previous connections. Mr. Earle for the past five years was general manager of the Whiting-Patterson Company, paper dealers. The new company has effected several desirable mill connections, and will deal in all fine papers as well as wrapping, tissue and other coarse papers. The concern expects to move to larger quarters about May 1, and will carry a complete stock of papers.

The Du Pont Company, Wilmington, Del., has just distributed to its employes 14,484 shares of its own stock, of a par value of $1,448,400, and $130,000 in other securities as the matured portion of bonus awards made during the years 1918 to 1921 inclusive. This distribution is in line with an amendment recently made to the company's bonus plan, which shortens the period between the bonus award and the delivery of the stock certificates. The bonuses awarded for 1922 amounted to 2,300 shares, of a par value of $230,000. They were distributed among 300 employes.

Announcement is made of the formation of the Scandinavian Pulp Agency, Inc. This is a corporation organized under

VEELOS

Genuine Balata Belting

will relieve your belt troubles. It is the ideal belt for the service demanded in the paper industry. The powerful driving ability of Veelos, together with the pleasure giving freedom from trouble and the saving of time and temper make Veelos the best adapted belt for service in paper mills. On a service basis it is more economical than any other belt.

THE STANDARD BELT OF THE WORLD

Manheim Manufacturing & Belting Company
Manheim, Pa.

Guaranteed Perfect

Draper Hollow Balanced Brass Balls

FOR STUFF PUMPS

Absolutely balanced; will not pound out of shape

Specify these when ordering new pumps.

Order these to replace worn-out balls.

We make a specialty of repairing stuff pump balls.

We also manufacture—
SOLID BRASS BALLS
IRON AND STEEL BALLS
BALL CHECK VALVES
VALVE FACING TOOLS

The Draper Manufacturing Co.

Port Huron, Mich. **Petrolea, Canada**
Every ball bears our registered trade-mark

334,000,000 Cubic Feet National Forest Timber and Pulpwood For Sale

LOCATION AND AMOUNT—Timber to the estimated amount of 334,000,000 cubic feet, to be cut from two areas within the Tongass National Forest, Alaska, more particularly described as follows: Tract No. 1 of about 43,000 acres, on the east shore of Frederick Sound and on the south shore of Thomas Bay, from which it is estimated that 74,000,000 cubic feet, more or less, of Sitka spruce, hemlock, and other species, approximately 27 per cent Sitka spruce and 72 per cent hemlock, can be cut; Tract No. 2, embracing about 300,000 acres on the north portions of Kupreanof Island and Kuiu Island, between Cape Bendel and Point Kingsmill, from which it is estimated that 260,000,000 cubic feet, approximately equivalent to 2,600,000 cords, more or less, of Sitka spruce, hemlock, and other species, approximately 21 per cent Sitka spruce and 78 per cent hemlock, can be cut.

STUMPAGE PRICES—Lowest rates considered, $0.60 per 100 cubic feet for Sitka spruce, western red cedar and Alaska cedar and $0.30 per 100 cubic feet for hemlock and other species. Rates to be adjusted every five years.

DEPOSIT—With bid $10,000, to be applied on the purchase price, refunded or retained in part as liquidated damages, according to the conditions of sale.

FINAL DATE FOR BIDS—Sealed bids will be received by the District Forester, Juneau, Alaska, up to and including July 31, 1923. The right to reject any and all bids is reserved.

Sample agreement giving full information on conditions of sale will be furnished interested parties on and after May 1, 1923.

Before bids are submitted full information concerning the character of the timber, conditions of sale, deposits, and the submission of bids should be obtained from the District Forester, Juneau, Alaska.

Stickle Compound Condensing System and Automatic Steam Control *for Paper Machines*

As shown in the folder we sent out to the mills—"*How to Dry Paper*"—showing our Compound Condensing System for draining the dryers and heating the air with the discharge from the dryers to condition the machine room should interest you. We guarantee a saving of 20 per cent in steam consumed for this purpose.

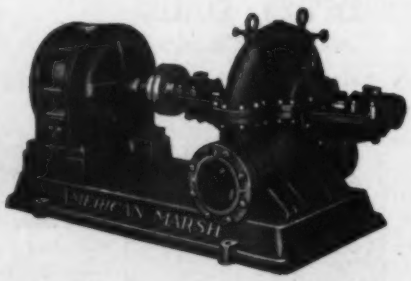
Stickle Steam Specialties Co.

Indianapolis Indiana

Boston Philadelphia

American-Marsh Paper Mill Pumps

Centrifugal and Direct Acting

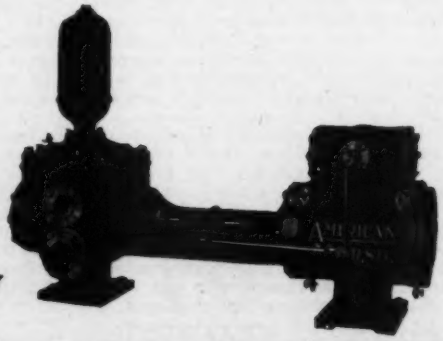


ESPECIALLY adapted for paper mill service where absolute reliability and high efficiency are required. There is an American-Marsh pump for every paper mill requirement, from draining the rolls on the dryers to handling heavy paper pulp stock.

Because of the fact that the factory is located in the heart of the largest paper mill district in the world, we have always made a specialty of paper mill pumps and our designs are the result of careful first hand study of the actual requirements.

The line includes

Boiler Feed Pumps
Centrifugal Pumps
Stock Pumps
Deep Well Engines
Jet Condensers
Air Compressors
Vacuum Pumps
Power Pumps



May we send you our general catalog?

American Steam Pump Company
Battle Creek, Michigan

the laws of the State of New York, with main offices at 50 E. 42nd St., New York. This company will engage in the business of importing wood pulp and will act as selling agents for a number of large pulp mills in Sweden. These include Uddeholm, Wifsta Warf, Stora, Utansjo, Wermbohl, the combined output of which totals about 185,000 tons yearly.

The Chicago Belting Company announces the opening of a direct factory branch at 66 Forsythe Street in Atlanta, Ga. The opening of this branch is the result of the growing business enjoyed by this company in the very progressive and rapidly growing territory for which Atlanta is the distributing center. The new branch will be under the management of two Georgia boys—Mr. Ben L. Willingham and Mr. Brad Hodges.

The Certain-teed Products Corporation, manufacturers of roofing papers with offices in the Woolworth Building, New York, has leased an entire floor comprising 17,700 square feet in the new Pershing Square Building, New York, as its new headquarters, and intends to move its executive offices from St. Louis to New York. The lease is for a long term and aggregates $750,000 in rentals.

An order for a 204-inch Fourdrinier newsprint machine has just been placed by the Ontario Paper Company, Thorold, Ontario, with Rice, Barton & Fales, Inc., Worcester, Mass. Delivery of this large machine is to be made early in the autumn of this year, and the machine is to be installed in the new mill which the Ontario Paper Company is to operate at Tonawanda, N. Y.

A course in the Chemistry of paper making is now being organized by the Department of Chemistry of the Cornell University. It is expected to ultimately develop several courses along the general line of paper chemistry and to do some research work in this field. This new course will be under the general supervision of F. H. Rhodes, Professor of Industrial Chemistry.

A petition in bankruptcy was filed on March 10 against the Alexander-Holden Company, Inc., paper dealers of 111 Hudson Street, New York, by E. O. Dorman, creditor for $919; the Paper Corporation, $523, and the Drayage Corporation, $92. The petition stated that the corporation had admitted its inability to pay its debts, but no statement of liabilities and assets was given.

The convention of the International Association of Printing House Craftsmen will be held in Buffalo, N. Y. during the month of August this year. There will be no exposition in connection with it. The Boston Printing Craftsmen, however, are conducting an excursion to Bermuda for their members and friends. The excursion will leave from Boston April 14.

The Willimantic River Paper Co., Inc., South Coventry, Conn., has been organized to take over the South Coventry Paper Mills. Plans for remodeling the plant call for a new water wheel, additional paper making machinery, and an addition to the main building. The plant is not expected to be in operation for a few weeks to come.

The paper mill owned by H. P. Richmond of Valatie, N. Y., has been sold to Paul L. Houston, formerly in the employ of the U. S. Government, Department of Commerce, Bureau of Standards at Washington. The mill will continue operation under the name of the Centennial Mills. Gibbs-Brower Company, New York City, acted as selling agents.

The Adirondack Paper Corp., Ballston Spa, N. Y., is a recently formed organization with the following in control: F. B. Oldham of Newtonville, B. G. MacDonald of Albany and L. C. Case of Guilderland. The new corporation has leased the local mill of the Island Paper Co. and plans are under way to remodel same.

The Fifth Annual Convention of the National Lime Association will be held at the Hotel Commodore, New York City, June 13, 14 and 15, 1923. The work of the convention will be devoted in a large measure to reports from the technical men of the research organization and from the field engineers of the Association.

Miller and Boyle of Kalamazoo, Mich., have been awarded a contract for the construction of a $60,000 addition to the Hopper Paper Mill of Taylorville, Ill.

PRATT & CADY
ASBESTOS PACKED COCKS

Fig. 246

Vulcanized asbestos groove-packed iron cocks for rugged service or caustic lines. Especially adapted for use on digesters.

Pratt & Cady asbestos packed cocks are made to stand pressures up to 250 lbs. and temperatures up to 500° F. Their use will prove economical.

Fig. 247

Reading Steel Casting Co., Inc.
Pratt & Cady Division
General Sales Office: Bridgeport, Conn.

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On the basis of past performance:
Davis Regulator leads!

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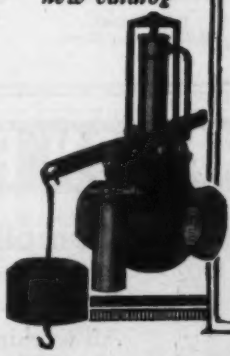

THERE'S only one test of the dependability of a valve specialty — the record through the years, of those in service. This test proves that the Davis Regulator undeniably leads!

For almost a half century—since 1875—Davis Regulators have been giving trustworthy service. The hundreds of engineers who know them will assure you of that.

The Davis principle is right; there are no springs, toggles or packing. The regulator is just a simple piston type valve that's built like a pair of balanced scales and that's just as reliable.

The new catalog describes the Davis Regulator and the complete series of Davis Valve Specialties in detail. Ask the G. M. Davis Regulator Co., 414 Milwaukee Ave., Chicago, for your copy.

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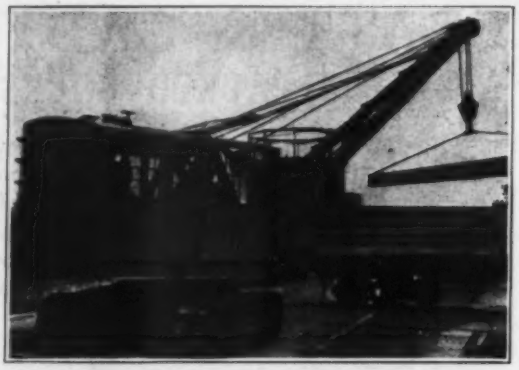
STEAM SAVERS SINCE 1875
SPECIALTIES



The Type BC "Industrial" Crawling Tractor Crane

is well adapted to the needs of paper and pulp companies, lumber and logging companies for the handling of bulky materials, speedily, safely and economically.

"Industrial" Cranes are readily convertible for various operations—pile driving, automatic bucket operation, steam shovel work, and for handling heavy lifts with hook and block.

The Type BC "Industrial" Crawling Tractor Crane operated by gasoline, offers many advantages. When the job is finished, shut off the throttle and all expense stops—including cost of fuel—until work starts again.

Operating independently of rails, this Crane insures maximum utilization of yard storage space.

The mobility of this Crane in loading and unloading cars of logs, timbers, pulp wood, and handling coal with grab bucket saves its cost many times over.

Perhaps an "INDUSTRIAL" could remedy your handling methods.

Catalog No. P-109 forwarded upon application

INDUSTRIAL WORKS, Bay City, Mich.

BUYING

O. S. Dependable Cranes

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Buckets

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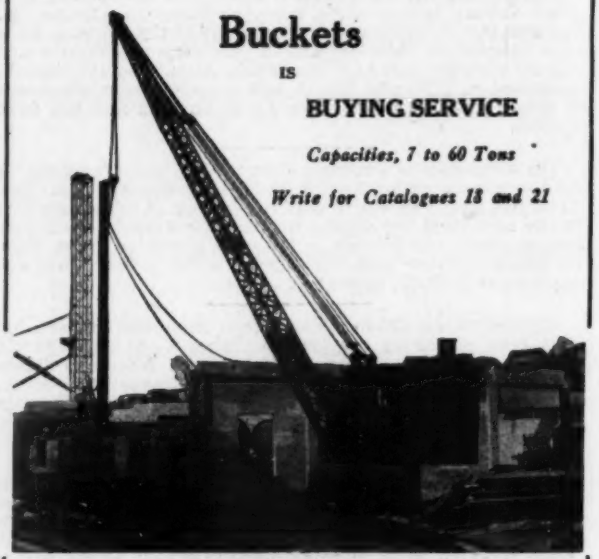
BUYING SERVICE

Capacities, 7 to 60 Tons

Write for Catalogues 18 and 21



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Offices CHICAGO, ILL. Shops HUNTINGTON, IND.

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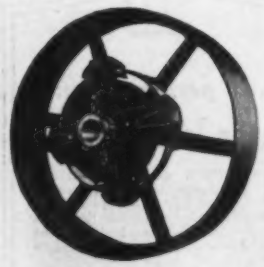
THE FALLS CLUTCH & MACHINERY COMPANY



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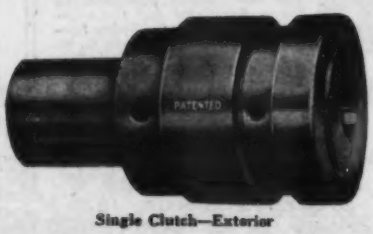

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Complies With All Insurance Regulations

Its exterior is perfectly smooth without protruding parts.

No clatter—No Bang.

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Dye Jiggers
Bottle Labelers
Tire Wrapping
Paper Cutter
Lathes
Screw Machines
Grinders
Drill Presses
Boring Mills
Millers
Tobacco Machinery
Cigarette Machinery
Folding Machine

Write for Stock List and Catalog "PI"

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN

Just as we are going to press, a bulletin comes to us issued by the Swenson Evaporator Company of Havey, Ill. The subject of this bulletin is "Swenson Reclaiming Machinery" an explanation of which is made interesting and understandable by means of a blueprint chart and nicely reproduced photographs.

A. E. Montgomery, Jr., formerly with the Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis., on May 1st will take charge of the Chicago office of J. O. Ross Engineering Corp. This office will be located at 549 W. Washington Blvd.

The Margaree Paper Company, Modena, Pa., will break ground shortly for a new plant which will comprise two main mills. Each of these mills will be 180x200 feet estimated to cost about $150,000, including machinery. A power house will also be built.

Uehling Instrument Company, Paterson, N. J., manufacturers of CO_2 recording instruments, have appointed the Combustion Engineering Corporation, Ltd., with head office in Toronto and branches in Montreal, Winnipeg and Vancouver, as their Canadian engineers and sales agents.

The Arabol Manufacturing Company, New York City, is now located in its new offices which are diagonally across from the Grand Central Terminal, 110 E. 42nd Street. The company offers the use of its offices to their paper mill friends who happen to be stopping in New York.

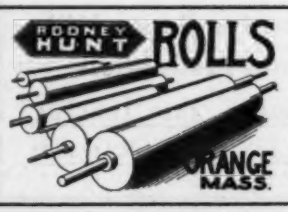
The American Paper and Pulp Association, with the assistance of men prominent in the paper industry, has worked out a plan for a luncheon club to be located in the Grand Central District, New York City. This club will be for men in the paper and allied industries.

The National Paper Products Co., Carthage, N. Y., is negotiating for the lease of the C. R. mill of the International Paper Co., which is at Glen Park, N. Y. Equipment for the manufacture of tissue will undoubtedly be installed if the negotiations mature.

The Paraffine Cos., Inc., 34 First street, San Francisco, are to build a one-story addition to their plant at an estimated cost of $40,000. Fred Stamm, Antioch, Calif., is the contractor, and Leland Rosener, Insurance Bldg., San Francisco, is the architect.

I. Gilman & Company, manufacturers of paper bags, have moved from 866 Hudson Street, New York City, to 342 Madison Avenue, New York.

The Garden City Paper Mills, Ltd., St. Catherines, Ont., is planning for the early erection of a new mill at Merritton, Ont.



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SATISFACTION
FOR
PAPER MILLS
Rodney Hunt Machinery Co.
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INDUSTRIAL—AGRICULTURAL—MUNICIPAL—RESIDENTIAL
A Type for Every Service
THE GOULDS MANUFACTURING COMPANY
SENECA FALLS, N. Y.
GOULDS

Superintendent-Manager Wanted
Bi-sulphite liquor by-product plant. Must be familiar with various processes and have had successful experience in plant operation. State salary desired, experience, etc. Apply Box 45, The Paper Industry.

WANTED
Chemist with good education and experience in manufacturing sulphite, for Mill Control Laboratory of large establishment manufacturing Pulp and Paper.
Must be of proved ability and capable of handling a staff. The right man for this position can count on good prospects. State qualifications in full and salary wanted in first letter. Address The Paper Industry, Box 47.

POSITION WANTED
—as production executive or superintendent of container plant or combined mill and container plant. Proven executive ability and thoroughly conversant with office accounting and cost systems. 32 years of age. Family. Write Box 49, care The Paper Industry.

CHEMIST WANTED
A progressive board company desires chemist having a wide fibre experience for research work. Interesting problems. Pleasant place in which to live. Give experience and references. Replies considered confidential. Address X,Y,Z, care The Paper Industry.

Paper Mill for Sale
Plant known as the Carney Paper Mill, at Maumee, Ohio. Two cylinders, 28 dryers, 64" trim; capacity, 10 to 15 tons; about 7 acres land. Address, Austin A. Miller, Receiver, 918 Ohio Bldg., Toledo, Ohio.

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Permanent position for man experienced in selling Paper Working Machinery; such as, paper making or finishing machinery, or machinery for coating, corrugating, printing. Character and ability will insure desirable connection on salary and commission with concern of high standing in Paper Industry, located Brooklyn, New York. Write, stating experience and references. Applications strictly confidential. Box 50, care The Paper Industry.

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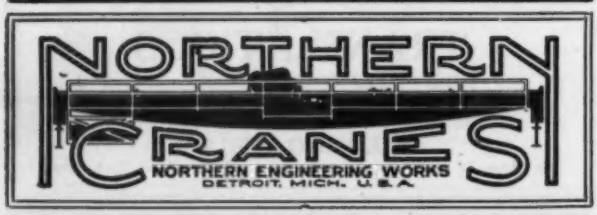

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AND STEAM POWER PLANTS
ELECTRIFICATION PAPER MILL PROPERTIES
39 S. LA SALLE ST.
CHICAGO

New York, April 2, 1923.

PAPER mills of the United States are working at a record rate of capacity. This statement is made on the basis of reports emanating from manufacturing centers which, almost without exception, tell of mills operating at a rapid pace, and which are substantiated by the latest statistics relating to paper production issued by the Federal Trade Commission. The January report of the commission shows that paper mills established a new high total of production of all kinds of paper in that month, while the commission's February report on print paper shows that news print mills operated at even greater daily capacity during that month than in January.

Paper manufacturers of the country produced a total of 664,553 net tons of paper and paper board during January, which output exceeded not only that of any month in 1922, but was larger in any month during the boom in the paper industry back in 1920, when the record month's production reached a total of about 653,000 net tons. That production continues to run at the high level recorded in January seems proved by the February news print report which shows that while a smaller total of print paper was produced in that month compared with January a larger daily output was reached. Production of total news print in February was 114,611 net tons, which was somewhat below the January output of 127,452 net tons, but considering that the former month was shorter than the latter and allowing for observance of holidays, it is found that print paper mills produced at the rate of 5,118 net tons daily during February, contrasted with 4,902 net tons a day produced in January.

January production of paper of all kinds was far above that of the same month a year ago when 506,195 net tons were produced, and was no less than 121,000 tons in excess of the average monthly output of 542,906 net tons based on reports covering the past five years.

There is no doubting that the first quarter of 1923 was one of the busiest periods paper manufacturers have ever experienced; in fact, it seems safe to state that it was the liveliest period they have ever enjoyed. What is still more pleasing is that the outlook for the second quarter is for a further expansion of activity in the paper industry. Not in a long time have the mills of the country been so well booked ahead on orders as they are over the next three to four months. Reports from numerous quarters say that papermakers have practically disposed of their entire output for at least three months, and that they have enough commitments on file to keep them operating at full capacity for this space of time. Consumers are going even further and are endeavoring to fortify themselves by having orders in the hands of manufacturers for paper for later shipment. A well defined belief exists that the paper industry will experience conditions bordering onto a boom in the fall of 1923, and a good many users of paper are anticipating their wants far into the future and are placing contracts freely against their forward requirements.

General business throughout the United States is good. Retail business during the pre-Easter season approached record volume; the public is prosperous owing to favorable industrial situations all over the country, and is spending money freely. This in itself explains the active position of the paper market. Paper is a commodity depending on various other lines of trade, and when business generally is brisk, it naturally follows there is a big movement of paper of all kinds.

The news print market is particularly strong. Publishers are absorbing print paper in record tonnage, and are almost constantly in the market seeking spot lots with which to augment their contract supplies. Most news print manufacturers are sold out completely up until the end of June. A majority of the contracts placed at the beginning of the year terminate at the close of the second quarter, and many in the trade look for a revision upward in quotations on print paper at that time. Certainly the demand as well as factors pertaining to the cost of production would seem to warrant an advance. However, manufacturers appear bent on maintaining the stability of the market and most of them are disinclined to consider raising prices, presumably feeling that to do so might militate to some extent against the broad demand at present prevailing for print paper.

One only has to watch the issues which publishers of daily newspapers in all parts of the country are putting out to understand the basis of the exceedingly strong market position of news print. New York publishers are printing larger issues than ever in their history; it was nothing unusual for some of the afternoon dailies in this city to issue 50-page issues during the pre-Easter season, while the morning papers and Sunday editions were proportionately as large. This, of course, means that consumption of news print is at a record level, and fully explains why paper mills are being rushed to satisfy the wants of their customers.

The situation in book papers has shown steady improvement. With the return of normal business conditions in various lines, advertising in the numerous magazines and trade periodicals has increased at a marked rate, and publishers have been almost constantly adding pages, thereby leading to a consistent growth in book paper consumption. Book paper mills are well supplied with orders. Most of them are sold ahead for at least two months, and have reached a point where they are no longer making promises respecting deliveries and are insisting that the matter of price be left open until shipments can be made. Prices of book paper exhibit a stiffening tendency. Machine finished book is quoted at about 7 cents a pound on an average f. o. b. New York, and super book at around 7.25 cents. Larger available supplies of casein has relieved the coated book paper condition somewhat and this kind of paper is quoted at from 9 cents per pound upwards, depending on the quality of the product.

Fine papers are active and inclining higher in price. Practically every description of raw material entering into the manufacture of bond and ledger papers is advancing in cost, and this is the all-important factor in the market, coupled with an expanding demand from consuming quarters. Manufacturers are finding it necessary to repeatedly revise quotations on fine papers, and the end of the rise is nowhere in sight as yet.

Coarse papers are moving freely. Wrappings enjoyed a lively season prior to Easter and were absorbed in large amounts despite the heavy importations of kraft wrapping paper from Germany and Sweden. Tissues also are active and quotably steady.

Box boards are in fair demand. Some mills are in want of additional business to enable them to run full although most of them are working at pretty close to capacity. Board prices have fluctuated over a rather broad range in the past month, particularly in the East, but have now steadied at around a basis of $70 per ton f. o. b. New York on news board and $65 a ton on plain chip.

Dinner for Coy, Disbrow & Co., Executives

Thursday evening, February 15, 1923, will live long in the memories of the employees of Coy, Disbrow & Company, that beehive of energy on Canal Street, New York. On that evening they tendered to the officials of the company a testimonial dinner with Mr. H. T. Disbrow, president of the organization, and his good wife as special guests of honor.

This date marks the first anniversary of the incorporation of the company and selecting this as a basis on which to work the committee, headed by Mr. Ernest M. Beers, arranged a most enjoyable evening's entertainment.

Gathering at Cavanaugh's for dinner immediately following the day's work a roll call showed every employee, from the office boys up, present. Following a flashlight of the group a hearty dinner was served. Mr. Robert H. Coy, treasurer of the company, acting as toastmaster called upon the executives and a number of employees including the ladies.

The Upson Company is finding at least a partial solution to the problem of vacations through the use of a somewhat novel plan which they worked out. Briefly, the plan is for everyone to take their vacation at the same time and get it over with, instead of stringing it out over a period of several months. During the vacation period only a skeleton organization is retained.

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NEW YORK CITY

Domestic Raw Materials

Papermaking Rags

Not in a long time have papermaking rags been in quite so strong a market position as during the past month. Demand has developed at a steady rate and in large volume, and the advance of prices has kept pace with the increasing movement of supplies until market levels are now higher than have been recorded in several years or since the boom following the World War. Probably of all the different kinds of raw material consumed by paper manufacturers, rag stock has been marked by the greatest strength recently; certainly the rise in prices over the past several months has been proportionately greater than in other papermaking materials.

All indications point to the present situation in rag stock being a healthy one. The advance of prices has been occasioned principally by a brisk and voluminous demand from consumers, coupled with the fact that demand broadened at the very time of the year when available supplies of rags are lightest owing to limited collections during the winter. Moreover, it would appear as if the market will continue strong for at least a few weeks to come. It is likely that as the spring wears on the position of rag stock will ease somewhat, as it invariably does when incoming supplies from country sources increase apropos of spring housecleanings. However, there are many in the trade who are of the opinion that prices are not likely to recede as much this spring as they usually do at this season of the year, provided, of course, demand keeps up at the prevailing rate and no larger supplies are received from Europe than have come into the country in the past few months.

One of the pleasing features of the market, at least from the sellers' point of view, is that practically all grades of rags are sharing in the activity, and that prices on nearly all descriptions have scored advances almost in similar proportion to each other. There are several grades which stand out in the demand above others, but, generally speaking, all kinds of rags used in the manufacture of paper are freely wanted and have recorded a substantial rise in price within the past several months. Notably among the particularly desired grades are No. 1 new white shirt cuttings, extra fine packing of old white rags, and roofing stock.

From all accounts, accumulations of rags in the United States are far from sizeable. It is true that imports over recent months have been of fair magnitude, probably a good deal above normal importations, yet it must be remembered that consumption has increased at a rapid rate and that at this writing paper mills of the country are chewing up rag stock at a voluminous pace. Especially is this so with regard to roofing rags. Felt paper mills for several months have been experiencing prosperous times and have found it necessary to operate at close to maximum to fill their orders for roofing papers and to prepare for the expected onslaught of buyers during the spring months. Activity among writing paper mills has increased in very nearly like proportion, and consumption of better grades of rags has accordingly jumped an appreciable extent.

Against this bullish condition in the consuming trades has been at least some limitations on the available supply of papermaking rags. It is proverbial that collections throughout the country are light in the winter and this winter has been an especially severe one, which has served to reduce collections more than ordinarily. Another strong factor is that European dealers have watched the broader market develop in the United States and have pushed their prices up to high levels, thereby placing some restrictions on purchases by American consumers and importers abroad. Even now when prices are at a point where it would be presumed that foreign sellers would be glad to seize the opportunity to market their rags it is not uncommon for importers to be quoted prices by European dealers which they are unable to grant as they are beyond market limits in this country.

Roofing stock has gradually climbed in price until No. 1 packing is frely bringing 2 cents a pound f. o. b. shipping points, and No. 2 stock around 1.90 cents. Felt mills have placed orders for large quantities of foreign dark cottons for April shipment from Europe at around 1.65 cents a pound c. i. f. New York and other American seaports. Old white rags have advanced to where average quality packing of No. 1 repacked stock is selling at 7 cents and higher, with sales of extra fine packing of whites reported at as much as 9 cents at shipping points. Old thirds and blues are quoted at 2.75 cents for repacked and 2.25 cents for rough packing, representing sharp advances. New cuttings of all kinds are moving in good amounts and at firm prices. No. 1 white shirt cuttings are scarcely obtainable at less than 14 cents per pound, while other especially strong items are unbleached muslins, which are quoted at 12 cents; blue overall cuttings, quoted at 8 cents, and bleached canton flannels, priced at 11 cents.

Average quotations f. o. b. shipping points and exdock are:

New Stock—	New York and Chicago
White shirt cuttings, No. 1	14.00-14.50
White shirt cuttings, No. 2	7.00- 7.25
Fancy shirt cuttings	6.75- 7.00
Washables, No. 1	5.25- 5.50
Unbleached muslins	12.00-12.25
White lawns	11.25-11.50
Overall cuttings, blue	8.00- 8.25
Black silesias	5.50- 5.75
Light flannelettes	10.25-10.75
Canton flannels, bleached	11.00-11.25
Canton flannels, unbleached	9.75-10.00
Shoe cuttings, bleached	10.25-10.50
Shoe cuttings, unbleached	8.50- 8.75
Light silesias	8.25- 8.50
O. D. khaki cuttings	5.25- 5.50
Mixed khaki cuttings	4.25- 4.50
Corduroy cuttings	3.50- 3.75
Cottonade cuttings	3.75- 4.00
Linens, No. 1 white, foreign	15.00-16.00
Light prints, foreign	5.25- 5.50
Old Stock—	
Whites, No. 1, repacked	7.00- 9.00
Whites, No. 2, repacked	4.25- 4.75
Whites, house soiled	2.50- 2.75
Whites, street soiled	2.25- 2.50
Lace curtains	3.75- 4.00
Thirds and blues, rough	2.25- 2.40
Thirds and blues, repacked	2.65- 2.85
Black stockings	3.25- 3.50
Cotton canvas, No. 1	4.25- 4.50
White cotton batting	6.00- 6.50
Roofing, No. 1	1.90- 2.10
Roofing, No. 2	1.80- 2.00
Dark colored cottons, foreign	1.65- 1.75
Blue linens, foreign	3.50- 4.00
Grey linens, foreign	5.50- 6.00
White linens, foreign	10.50-11.00
Light prints, foreign	2.50- 2.75

Rope and Bagging

There has been little change in prices of old rope despite a continued brisk demand for this commodity. Paper mills are absorbing old rope in a steady manner and seem ready to purchase any lot offered so long as the price asked is within reasonable bounds, and while no further advancement is noted in market values, prices are very firmly maintained and rope moving into consuming channels is fetching strong prices. Domestic manila rope in No. 1 condition is selling to paper mills at 6.75 to 7 cents a pound at dealers' shipping points. There have been rumors of transactions at a little above 7 cents, and it is quite probable that some sellers have been successful in securing the higher figures mentioned, but the bulk of sales has been at 7 cents or a trifle under this price level. Foreign rope is selling at approximately a quarter of a cent per pound under the domestic article, though in certain instances mills have paid as much for imported rope of extra good quality as for domestic.

Chief activity in the old bagging market revolves around shipments to roofing paper mills. Felt manufacturers have bought bagging in fairly large amounts, and prices of this

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grade of bagging are within close proximity to those prevailing on stock of a quality used by tissue paper mills. Between 1.10 and 1.20 cents a pound at shipping points is the quotable basis on roofing bagging, while No. 1 scrap is available at 1.25 cents a pound. Old gunny bagging is active and strongly quoted, though consumers other than papermakers are the principal buyers of this material.

F.o.b. shipping point quotations follow:

	New York and Chicago
Gunny, No. 1 domestic	1.60- 1.75
Gunny, No. 1 foreign	1.50- 1.60
Scrap bagging, No. 1	1.25- 1.35
Roofing bagging	1.10- 1.15
Wool tares, heavy	1.50- 1.65
Wool tares, light	1.40- 1.50
Manila rope, No. 1 foreign	6.50- 6.75
Manila rope, No. 1 domestic	6.75- 7.00
Sisal strings	1.25- 1.50
Mixed strings	.90- 1.00

Old Paper

The easiness which developed in some grades—chiefly the low qualities—of old paper toward the end of February has been accentuated in the past several weeks, and prices have slid off considerably in certain cases. The reason for the weakness is hard to explain. Board mills are reported fairly active and are said to be absorbing waste paper in comparatively large amounts; other consumers also are reported to be buying in at least normal volume, moreover supplies do not appear to be in any way excessive. Just why prices should show so much easiness, therefore, is difficult to ascertain. It is known, however, that imports of waste paper from Europe—from British sources particularly—have been on the increase, and it may be that the addition of these supplies has been just sufficient to cause prices to recede.

Grades like folded newspapers and mixed paper have sagged badly, and the former are quoted at as low as 1.15 cents a pound at dealers' shipping points, while No. 1 mixed paper is down to 1 cent per pound, and common mixed paper to 75 cents a hundred pounds. Shavings are quoted at around 4.25 cents a pound for strictly No. 1 hard white, and 3.60 cents for No. 1 soft white. Old magazines have declined to where 2.40 cents is an average quotation on heavy books, and 2.05 cents on crumpled book stock. Old No. 1 kraft paper is selling at 2.25 cents, ledger stock at a range of 2.60 to 2.75 cents, and white bank news cuttings at 2.25 to 2.35 cents per pound.

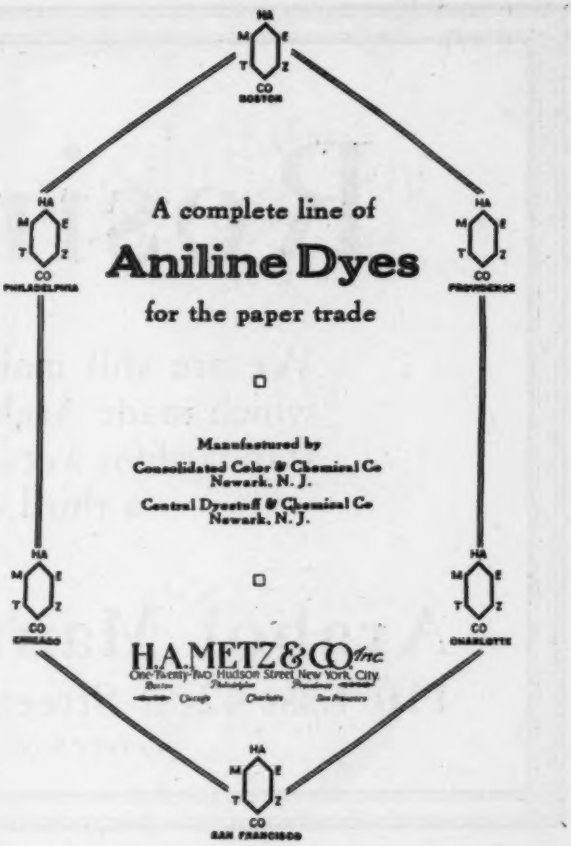
F.o.b. shipping point quotations are:

	New York and Chicago
Hard white shavings, No. 1	4.25-4.50
Hard white shavings, Nos. 2-3	3.50-4.00
Soft white shavings	3.50-3.75
Colored shavings	1.75-2.00
Heavy book, No. 1	2.30-2.50
Crumpled book, No. 1	2.00-2.10
Ledger stock	2.60-2.75
Kraft, No. 1	2.25-235
Manilas, No. 1	1.50-1.60
White blank news	2.25-2.35
Over-issue news, No. 1	1.55-1.65
Folded news	1.15-1.25
Mill wrappers	1.25-1.35
Box board cuttings	1.10-1.20
Mixed paper, No. 1	1.00-1.10
Common paper	.75- .85

Chemical Pulp

The bullish situation which has developed in foreign wood pulp as a result of the lockout in Swedish pulp mills has influenced domestic pulps to a marked degree, and there is a firmer tone to pulp prices than has been noted in a long time. It is generally argued by producers in the United States and Canada that the stoppage of production in Sweden can only lead to a larger demand for domestic and Canadian pulp during the next few months, and prospects of this have caused manufacturers to assume a much more bullish attitude regarding prices and sales for forward delivery, and has resulted in running prices up to at least some extent already.

Reports state that domestic pulp mills are operating far from full capacity. This is to be expected because for some four or five months past imports of pulp have been heavy, and papermakers have covered a large part of their requirements with imported pulp, thereby allowing them to limit their purchases in the domestic market. The situation is gradually reaching a point, however, where consumers are obliged to look more to domestic supplies to fill their wants, and as demand for the domestic product increases prices automatically stiffen. Many in the trade are of the opinion that if paper manufacturing operations during the next few months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continue on a part with those of the past several months the domestic pulp industry is due to enjoy one of the most prosperous periods in its history.

Leading producers of bleached sulphite quote 5 cents a pound at pulp mills on No. 1 bleached sulphite, with the selected grade quoted at 5.25 cents. No. 1 unbleached sulphite is quoted at 3 cents and higher, and news grade sulphite at around 2.85 cents. Kraft of No. 1 grade is priced at 3 to 3.25 cents a pound, and bleached soda pulp at about 4.10 cents at producing mills.

F.o.b. pulp mill quotations follow:

Bleached sulphite	4.50-5.25
Easy bleaching sulphite	3.15-3.25
Unbleached sulphite, No. 1	3.00-3.25
News grade sulphite	2.80-3.00
Soda pulp, bleached	4.00-4.25
Mitscherlich, unbleached	3.25-3.50
Kraft, No. 1	3.00-3.25
Screenings, refined	1.10-1.25

Mechanical Pulp

Ground wood is in a rather uncertain market position. Reports with rare exception tell of a good demand from various consuming quarters, it being stated that newsprint mills are buying freely, that board manufacturers are actively in the market, and that other consumers are absorbing mechanical pulp in comparatively large amounts, yet in spite of the good demand reported prices exhibit far from a firm tone. Probably the explanation is that more favorable weather conditions have enabled many grinders to increase their operations, thus providing a larger supply for buyers to draw on and prompting some sellers to grant price concessions to move stocks.

Another bearish factor is that Canadian grinders have reduced quotations substantially. Whereas not so long ago prices prevailing across the border were up around $45 a ton at grinding plants, sales by Canadian producers have been recently reported at as low as $35. Such reports regarding prices appear to contradict other reports that grinders in Canada have not yet been able to increase their output because mill streams remain frozen.

About an average of quotations on domestic prime spruce ground wood for prompt shipment is $42 a ton, f. o. b. producing mills. Prices a couple of dollars on either side of this figure have been reported, but it is said on good authority that the bulk of ground wood now moving into consuming channels is bringing at least this price. A factor which should be considered as likely to have influence on the future market is that the unusually heavy snows this winter should provide grinders with plenty of water during the coming summer and enable them to grind all the pulp for which consumers may have need.

Chemicals

Quotations on casein have eased considerably under the influx of larger supplies from the Argentine and other producing sources, and 19 cents a pound is about the ruling price at present, duty paid. Bleaching powder continues to move in good amounts and at steady prices of around 2 cents per pound for spot shipments. Caustic soda is quoted at 2.50 cents per pound for spot shipment, and soda ash at around 1.25 cents a pound. Brimstone quotations are maintained at $18 to $20 a long ton at mines, and Grade E rosin is quoted at 6 cents a pound. There is a good general movement of paper making chemicals, both contract and spot buyers operating freely in the market.

Average quotations are as follows:

Alum, lump ammonia	3.25- 3.50
Alum, lump starch	3.75- 4.00
Blanc fixe, powdered	4.00- 4.25
Bleaching powder	1.85- 2.00
Brimstone (long ton, at mine)	18.00-20.00
Casein (duty paid)	19.00-20.00
Caustic soda, spot delivery	2.50- 2.75
China clay, domestic washed	12.00-15.00
China clay, foreign	16.00-22.00
Rosin, grade E	6.00- ...
Satin white	1.50- 1.75
Soda ash, 58 per cent light (bags)	1.20- 1.30
Starch, papermakers', in bags	2.82- ...
Talc (ton)	14.00-16.00

The Century Trading Company, dealers in papermakers' supplies, has moved from 35 Warren Street, New York, to Smith and Bay Street, Brooklyn, N. Y., where it is operating an up-to-date warehouse and packing all grades of waste paper, rags, etc.

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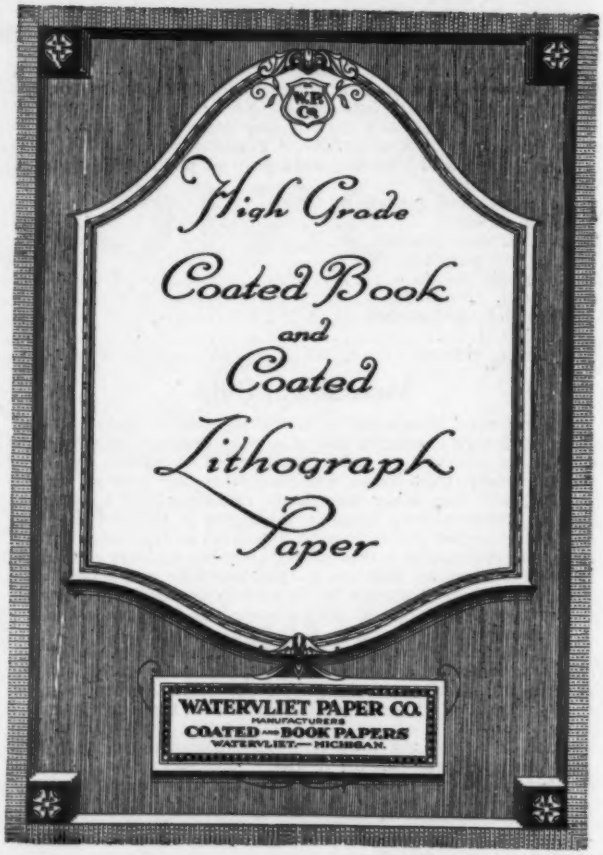

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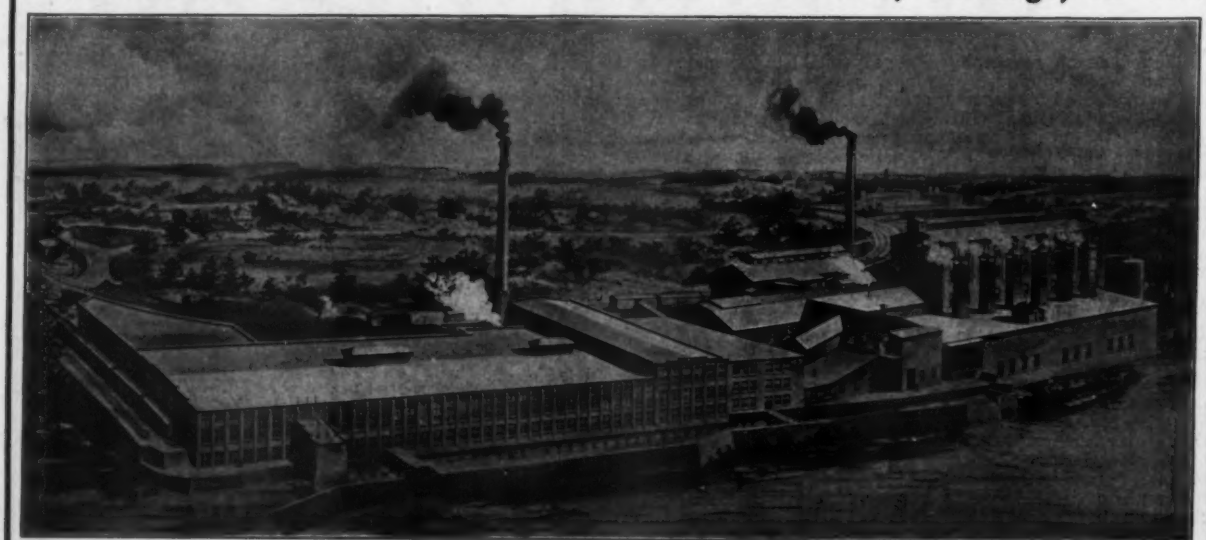

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New Papers

Writing—	
White rag	20-45
White sulphite	12-30
Colored rag	16-40
Ledger—	
White rag	20-50
White sulphite	14-30
Colored sulphite	15-30
Colored rag	16-50
Bonds—	
White rag	19-45
White sulphite	10-30
Colored sulphite	11-30
Colored rag	18-45
Book—	
No. 1 S. & S. C.	7.00- 7.75
Machine finished	6.75- 7.50
English finished	7.00- 7.75
Coated and enameled	9.00-14.00
Lithograph, M. F.	9.50-14.00
News Print—	
Rolls, contract	3.50- 3.75
Rolls, transient	4.00- 4.25
Sheets	4.25- 4.50
Side runs	3.25- 3.50
Cover Stock—	
Coated, both sides	10.25
Coated, one side	10.15
Tissue—	
No. 1 white, 20x30	.90- 1.00
No. 2 white, 24x36	.80- .90
No. 1 manila, 24x36	.80- .90
Kraft	1.00- 1.25
Wrappings—	
No. 1 Krakt	7.00- 7.50
No. 2 Kraft	6.25- 6.75
Boards—	New York and Chicago
Solid news	70.00-75.00
Straw	60.00-65.00
Plain chip	65.00-70.00
White coated chip	85.00-90.00
Manila Coated chip	80.00-85.00
Binders' board	90.00-95.00

Recent Publications

During the past few weeks the De Laval Steam Turbine Company of Trenton, N. J., has issued a number of attractive bulletins. Each one of these describes the use of De Laval equipment in some specific field linking this description to a specific installation in each field. These bulletins emphasize not only the versatility of De Laval equipment but its dependability wherever used.

A bulletin describing the Graver Zeolite Water Softening Equipment has just been issued by the Graver Corporation of East Chicago, Ind. By means of well prepared illustrations and concise explanations the process is presented in a clear and understandable manner.

The Austin Company, Cleveland, has made a comparison of the relative advantages and disadvantages of Multi-Story and Single-Story buildings in a booklet recently published. This eight page booklet is entitled "Multi-Story or Single Story—Which?" The construction costs of the two types are compared in this booklet, the relative operating costs are discussed, as well as general factors which influence the ultimate cost of a factory building. The booklet is also illustrated with charts and graphs.

"Republic CO_2 Recorders" is the title of a bulletin issued last month by the Republic Flow Meters Company, Chicago. Incorporated in this bulletin is a complete story, going into detail regarding the Republic CO_2 Recorder. This description is assisted by graphic illustrations of working parts and actual records. The bulletin is more than a piece of advertising. It is a work that should be a genuine help to any engineer.

The 1923 Year Book of the American Engineering Standards Committee is now ready for distribution. This book shows clearly that the national movement for industrial standardization accomplished more during the last year than in any preceding year and that the work has now reached the stage of mass production. It also brings out the fact that at the end of the year a total of 121 industrial standardization projects were definitely under way. 14 standards were approved during the year, bringing the total of approved national standards now existant in the United States up to 35.

The Kaelin Electric Steam Generator is the subject of Bulletin No. 101 issued by the Dominion Engineering Works, Limited, Montreal, Canada. This bulletin brings out many thoughts which will be helpful to any who are considering the advisability of installing an electric steam generator.

In a recent issue of "Archtecture" there appeared an article on "Integral Waterproofing—A practical Discussion" by Mr. Samuel R. T. Very. This same article has been reprinted by The Truscon Laboratories, Detroit, and is thus available in booklet form to all interested in the subject of waterproofing.

Rubber Latex Stock Used Here

A recent issue of The Rubber Age was made up with a cover of rubber latex cover stock. In commenting upon this newly discovered stock which furnishes a bond of mutual interest between the two great industries of paper and rubber, the aforementioned magazine brings out the following:

"After noting the interest aroused abroad and here in the subject of rubber latex paper we arranged to obtain sufficient quantities to use in several of our issues. Accordingly orders were immediately placed with both American and English paper manufacturers.

"In the United States we were fortunate in obtaining the co-operation of the Hammermill Paper Company, Erie, Pa. This concern had been making experiments with rubber latex and had been successful in obtaining satisfactory results.

"The cover of this issue is the first quantity batch of rubber latex paper made by Hammermill and constitutes the first order of such a stock placed in this country. It was made up especially for The Rubber Age.

"In tests made of this paper the Hammermill Paper Company stated: 'We find a pronounced improvement in certain respects, particularly in folding qualities. Sufficient time has not elapsed to determine other features, as durability, etc. Sufficient rubber latex was used to give one per cent rubber in finished paper. It is our intention to continue experimentation and tests.'

"It has, however, already been shown by other tests that rubber latex added to paper increases its folding properties about 100 per cent, its strength from 5 to 20 per cent, while its cost is approximately the same. The slight additional cost of the latex is overcome by the use of cheaper fibre. In addition the waterproofing quality is increased and the appearance is somewhat bettered.

"In one of our March issues it was proposed to use the paper stock purchased abroad from Lepard & Smiths, Ltd. This stock has already reached this country and after custom regulations are complied with it will be released for delivery to our plant."

A further patent has been taken out by Mr. Frederick Kaye in connection with the use of rubber latex in the manufacture of paper. According to this a small quantity of a solution alkaline sulphide is added to rubber, etc., latex before the latter is diluted and mixed with paper pulp in the process described in the parent specification. On addition of acid to coagulate the rubber, etc., sulphur is deposited for the subsequent vulcanization. With acid fibres, or paper sized with resin and alum, the addition of acid may be unnecessary. Sufficient sulphide to produce one-half per cent sulphur calculated on the rubber content is usually enough, but quantities to produce 10 per cent may be added.—The World's Paper Trade Review.

A contract was recently received by The Hill Clutch Company, Cleveland, from The Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich., through Billingham & Cobb, Engineers, for complete power transmission and agitator machinery for their new paper mill.

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Wood Pulp

The lockout in Swedish pulp mills has entered the third month and the effect of the bullish situation that has developed in this primary market is very pronounced in the United States. Prices of foreign pulps are steadily moving higher; in fact, the market appears to be rapidly nearing a booming condition, and should the shutdown of mills in Sweden continue much longer there is no saying how high prices may go. Importers are constantly taking a stronger view of the situation, and are careful about entering selling engagements. Spot lots of imported pulp are very firmly held at prices which represent a considerable advance over those prevailing only a short while ago, and the market unmistakably is headed for higher levels.

It is commonly conceded by consumers of pulp as well as sellers that every day the mills in Sweden remain down the market position becomes just so much stronger. It is estimated that already something like 160,000 tons of sulphite and kraft pulp have been lost to the consumers of the world through the maintenance of the Swedish lockout for the past two months, and all reports coming from the other side of the Atlantic tell of a bullish condition existing there. England is said to have been actively buying up all the supply of pulp to be had in Sweden, and unsold stocks of the commodity in the Scandinavian country have been reduced to a minimum. The salient factor now becoming evident is that unless the lockout is soon ended and Swedish mills resume production there will be no pulp available for shippers to fill their contracts when navigation opens over the Baltic during the next few weeks. This will necessitate American and British and other consumers who have placed orders with the Swedes to look elsewhere for pulp supplies, thus creating a big demand for pulp in other producing countries.

That shipments of pulp from Sweden to the United States continued heavy up until the declaration of the lockout of workers by manufacturers is indicated by the latest available Government figures, which show that imports of chemical wood pulp into this country in November last were larger than any month of 1922 up until December, totaling no less than 126,829 net tons of all grades of chemical, while ground wood imports in the same month were 27,475 net tons, also constituting a record for last year. Probably the large importations of pulp into the United States during the last few months of 1922 will prove to be a blessing to the paper manufacturing industry before the present pulp situation ultimately rights itself. Certainly these large supplies have served to keep the market in this country stable up to a short time ago in the face of the bullish conditions obtaining abroad, and are likely to have a restraining effect on the market position here in the near future regardless of developments at primary sources.

That a new high record of pulp imports into the United States was established last year will unquestionably be shown when statistics for December are issued by the Government. For the first eleven months of 1922 imports totaled 876,510 net tons of chemical pulp and 185,131 net tons of ground wood, giving an average monthly of 79,682 net tons of chemical and 16,830 tons of ground wood. Pulp imports have never before been this large in any one year, and are not likely to be so heavy in 1923.

Quotations have stiffened to a pronounced degree. Especially are unbleached sulphite and kraft pulp firm in price since the bulk of these grades imported into the U. S. comes from Sweden. No. 1 unbleached sulphite has advanced to where importers seldom quote less than 3.25 cents a pound ex dock New York or other American ports, with some asking beyond this rate. Swedish kraft pulp is quoted at from 3.15 cents a pound upwards on the dock, while easy bleaching sulphite is priced at about 3.50 cents ex dock. Bleached sulphite of selected grade has sold at 4.90 cents per pound ex dock New York, and quotations range down to about 4.50 cents on less desirable qualities. Foreign ground wood is quoted at around $44 a ton on the dock.

Receipts at the port of New York in March and current market quotations, ex dock New York, follow:

Bleached sulphite, No. 1	$ 4.50- 5.00
Unbleached sulphite, No. 1	3.20- 3.35
Easy bleaching	3.30- 3.50
Mitscherlich unbleached	3.25- 3.50
Kraft	3.15- 3.35
Ground wood, per ton	43.00-45.00

Castle & Overton, 2,295 bls. from Rotterdam, 755 bls. from Hamburg and 1,461 bls. from Bremen; H. Hollesen, 1,050 bls. from Hamburg and 10,213 bls. from Bremen; Lagerloef Trading Co., 2 bls. from Helsingfors; M. Gottesman & Co., 2,215 bls. from Hamburg, 7,761 bls. ground wood from Liverpool, N. S., 1,290 bls. from Rotterdam and 600 bls. from Bremen; American Woodpulp Corp., 4,302 bls. from Hamburg; Tidewater Paper Mills Co., 24,895 bls. ground wood from Liverpool, N. S.; E. J. Keller Co., 500 bls. from Bremen; Johaneson, Wales & Sparre, 565 bls. from Stockholm; E. M. Sergeant & Co., 1,000 bls. from Christiania; Borregaard Co., 1,380 bls. from Christiania; J. Andersen & Co., 1,710 bls. from Christiania; A. J. Pagel & Co., 2,385 bls. from Kiel; National City Bank, 3,750 bls. ground wood from Christiania, 5,680 bls. ground wood from Stockholm, and 953 bls. from Rotterdam; Irving National Bank, 520 bls. from Helsingfors and 1,155 bls. from Hango; Mechanics & Metals National Bank, 1,800 bls. from Bremen; Nilsen, Lyon & Co., 300 bls. from Christiania; Brown Bros. & Co., 1,256 bls. from Hamburg; Order, 5,440 bls. from Port Alice, B. C.

Paper Stock

Imports of papermaking materials other than wood pulp were of moderate volume in March, judging from arrivals at the port of New York. Shipments of rags were numerous though of rather small tonnage, the reason for this being apparently that dealers in Europe were bullishly inclined regarding prices and offered supplies in comparatively small lots insofar as individual offers were concerned. Old rope receipts were fairly large, and there were some sizable amounts of waste paper imported from England chiefly and other sources.

Arrivals at the port of New York during March follow:

Old Rope

Katzenstein & Keene, 21 bls. from Naples and 172 coils from London; W. H. Cummings & Sons, 63 coils from Havre; M. Flynn, 22 bls. from San Juan; M. Wolfer & Co., 8 bls. from Havana; Salomon Bros. & Co., 22 bls. from Havre; G. M. Graves & Co., 74 coils from Newcastle; Cuban-American Metal Co., 19 bls. from Havana; Brown Bros. & Co., 483 coils from Hull, 204 bls. and 198 coils from Antwerp, 75 coils from Copenhagen, 309 coils from Rotterdam, 86 coils from Newcastle, 151 coils from London and 77 coils from Bristol; W. Schall & Co., 86 coils from Newcastle; Old Colony Trust Co., 133 bls. from Dunkirk; Chemical National Bank, 91 coils from Bremen; American Exchange National Bank, 100 coils from Hamburg; New York Trust Co., 158 coils and 31 bls. from Hamburg; Irving National Bank, 53 bls. from Havre; Mechanics & Metals National Bank, 240 coils from Newcastle; Ellerman-Wilson Line, 63 coils and 12 bls. from Hull; Order, 114 coils and 202 bls. from Rotterdam and 59 coils from London.

Old Bagging

Waste Material Trading Corp., 100 bls. from Antwerp; American Express Co., 4 bls. from Antwerp; Irving National Bank, 106 bls. from Manchester; E. J. Keller Co., 62 bls. from Rotterdam, 202 bls. from Havre, 75 bls. from Bremen, 271 bls. from Hamburg and 195 bls. from Antwerp; Mechanics & Metals National Bank, 190 bls. from Manchester; I. Dorfman & Son, 1,455 bls. from Cardiff; Maurice O'Meara Co., 146 bls. from Rotterdam; Katzenstein & Keene, 120 bls. from Rotterdam and 18 bls. from Antwerp; E. Salomon Corp., 160 bls. from Rotterdam; R. F. Downing & Co., 86 bls. from Havre; New York Trust Co., 100 bls. from Havre; Coal & Iron National Bank, 101 bls. from Rotterdam; Order, 210 bls. from Antwerp and 56 bls. from Liverpool.

Rags

Stone Bros. & Victor Galaup Co., 657 bls. from Havre and 42 bls. from Dunkirk; Katzenstein & Keene, 135 bls. from Havre, 313 bls. from Hull, 95 bls. from Antwerp, 199 bls. from

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Miscellaneous Paper Stock

E. J. Keller Co., 249 bls. from Hamburg, 996 bls. from Antwerp, 6 bls. from Rotterdam and 202 bls. from Havre; Katzenstein & Keene, 373 bls. from Rotterdam, 25 bls. from Barcelona and 220 bls. from Naples; Waste Material Trading Corp., 315 bls. from Rotterdam; Mechanics & Metals National Bank, 94 bls. from Rotterdam; Brown Bros. & Co., 219 bls. from London, 244 bls. from Dublin and 70 bls. from Bristol; Equitable Trust Co., 74 bls. from London; Irving National Bank, 1,199 bls. from Antwerp and 169 bls. from Hamburg; L. H. Abenheimer, 291 bls. from Rotterdam; McEwan Bros., 198 bls. from Dublin; Ohio Boxboard Co., 151 bls. from Dublin; Salomon Bros. & Co., 865 bls. from Havre; London & Liverpool Bank of Commerce, 117 bls. from London; Atlantic Waste Material Co., 21 bls. from London; Guaranty Trust Co., 29 bls. from Glasgow; John T. Boyle Co., 74 lbs. from Dublin; Prince & Kennedy, 9 bls. from Dublin; Order, 50 bls. from Glasgow, 325 bls. from Rotterdam, 101 bls. from Manchester, 81 bls. from London, 127 bls. from Leghorn, 1,019 bls. from Liverpool, 150 bls. from Antwerp and 336 bls. from Hamburg.

Paper

Large arrivals of kraft wrapping paper from Germany and the Scandinavian countries continued to feature the import trade of the United States in paper in March. Receipts of wrapping paper were fully up to those of the several previous months, and constituted the great bulk of foreign paper brought into this country last month. Imports of newsprint were comparatively light. In this connection it is interesting to note that, according to Government statistics, exports of paper from Germany during the fiscal year ended April 30, 1922, constituted only 14 per cent of the total shipments of paper and paper products from the important paper exporting countries of the world, whereas in 1908 and 1913 its share had been 30 per cent, which would discount all of the propaganda of the Germans flooding the American market with news print. The great bulk of paper exports from Germany last year, however, was print paper, shipments totaling 120,103 short tons, compared with 75,782 short tons in 1913 and 56,064 short tons in 1908. Imports of cigarette, filter, hanging and drawing papers were fairly large last month, judging from arrivals through the port of New York. Receipts of paper of all kinds at the port of New York in March follow:

Cigarette

American Tobacco Co., 3,013 cs. from Bordeaux; R. J. Reynolds Tobacco Co., 1,700 cs. from St. Nazaire; Ligget & Myers Tobacco Co., 32 cs. from Bordeaux; G. A. Henshaw & Sons, 91 cs. from Liverpool; M. Spiegel & Sons, 26 cs. from Genoa; DeManduit Paper Corp., 620 cs. from Havre; Rose & Frank Co., 304 cs. from Havre and 65 cs. from Southampton; P. J.

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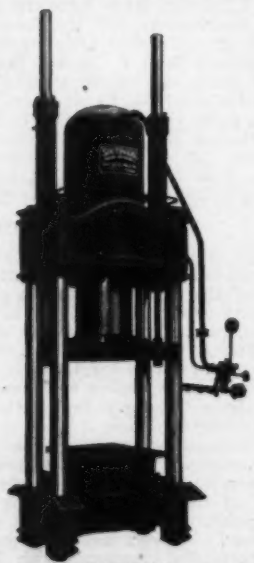

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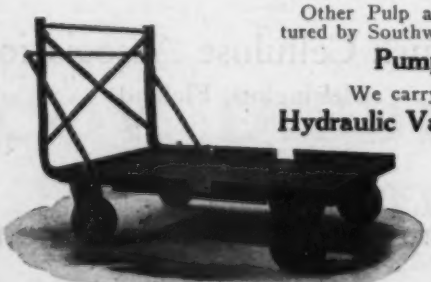

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Printing

American Exchange National Bank, 43 rolls from Christiania; Chemical National Bank, 636 rolls from Rotterdam and 261 rolls from Hamburg; F. B. Vandegrift & Co., 112 cs. from Hamburg; Lunham & Moore, 5 cs. from London; Publicity Paper Corp., 149 rolls from Hamburg; Globe Shipping Co., 90 cs. from Bremen; United States Lines, 13 rolls from Bremen; Newsprint Paper Corp., 345 rolls from Gothenburg; H. Reeve Angel & Co., 1,088 rolls from Antwerp and 251 rolls from Bremen; B. F. Drakenfeld & Co., 128 cs. from Liverpool; W. F. Etherington & Sons, 106 cs. from Glasgow; Parsons & Whittemore, 1,123 rolls from Bremen; Republic Bag & Paper Co., 155 rolls from Hull; Maurice O'Meara Co., 104 rolls from Christiania and 117 rolls from Antwerp; H. Lips, 140 cs. from Antwerp; Steiner Paper Corp., 52 bls. from Rotterdam and 50 cs. from Bremen; P. Puttmann, 20 cs. from Antwerp; Perry, Ryder & Co., 134 cs. from Glasgow; C. B. Richard & Co., 4 cs. from Danzig; Oxford University Press, 29 cs. from Liverpool; Order, 455 rolls from Christiania, 315 rolls from Bremen, 86 rolls from Rotterdam, 158 rolls from Hamburg and 4 cs. from Glasgow.

Wrapping

Equitable Trust Co., 61 rolls and 12 bls. from Copenhagen, 561 rolls and 135 bls. from Hamburg and 47 bls. from Trondhjem; Wilkinson Bros. & Co., 527 rolls and 365 bls. from Copenhagen, 157 rolls and 191 bls. from Rotterdam and 413 rolls from Christiania; Chemical National Bank, 214 bls. from Gothenburg, 58 bls. from Hamburg, and 102 rolls and 88 bls. from Rotterdam; Flexidral Co., 41 bls. from Copenhagen; C. K. McAlpine & Co., 931 rolls and 210 bls. from Gothenburg; Fernstrom Paper Co., 3 bls. from Gothenburg and 20 rolls from Norrkoping; Thomas Barrett & Son, 57 bls. from Gothenburg; H. Fishman, 544 rolls from Gothenburg; Ladenburg, Thalmann & Co., 6,742 bls. and 273 rolls from Hamburg; W. Schall & Co., 199 rolls from Hamburg and 11 bls. from Copenhagen; Steiner Paper Corp., 39 cs. from Bremen; Blauvelt-Wiley Paper Mfg. Co., 93 bls. from Glasgow and 67 bls. and 24 rolls from Norrkoping; American Exchange National Bank, 93 rolls and 306 bls. from Christiania; D. C. Taggart, 495 bls. from Christiania; United Fruit Co., 38 bls. from Christiana; Funch, Edye & Co., 17 rolls from Christiania; International Acceptance Bank, 1,021 rolls and 225 bls. from Christiania, 136 rolls and 36 bls. from Stockholm and 40 rolls and 300 bls. from Trondhjem; J. Munroe & Co., 2,637 rolls from Hamburg; Public National Bank, 1,703 bls. from Hamburg; D. S. Walton & Co., 407 rolls and 167 bls. from Norrkoping and 405 rolls and 26 bls. from Gothenburg; Peoples Trust Co., 752 rolls and 4 bls. from Stockholm and 2,556 rolls and 113 bls. from Gothenburg; Melby, Kuttroff & Co., 438 rolls and 305 bls. from Trondhjem; C. F. Hubbs & Co., 7 bls. from Rotterdam; North German Lloyd, 39 cs. from Bremen; American Express Co., 62 bls. from Bremen; C. Hamm, 23 rolls from Rotterdam; Waterbury Trust Co., 233 rolls from Christiania; Republic Bag & Paper Co., 23 rolls from Rotterdam; Guaranty Trust Co., 81 rolls from Hamburg; Order, 190 rolls and 865 bls. from Gothenburg, 27 rolls and 731 bls. from Hamburg and 255 rolls from Rotterdam.

Writing

J. W. Hampton, Jr., & Co., 1 cs. from Southampton; Irving National Bank, 30 cs. from Antwerp; Coenca-Morrison Co., 6 cs. from Havre; Judson Freight Forwarding Co., 3 cs. from Bordeaux; G. Gentchegulian, 20 bls. from Trieste.

Drawing

Keuffel & Esser Co., 35 cs. and 229 rolls from Hamburg; E. Dietzgen & Co., 33 cs. from Marseilles and 10 cs. from Hamburg; A. Giese & Co., 9 cs. from Bordeaux; Favor, Ruhl & Co., 5 cs. from Genoa; D. C. Andrews & Co., 2 cs. from London; M. C. Lange & Co., 5 cs. from Bremen; Order, 11 cs. from London.

Filter

G. Lueders & Co., 2 cs. from Havre and 16 bls. from Bordeaux; American Express Co., 30 bls. from Bordeaux; Scientific Materials Co., 2 cs. from Bremen; H. Reeve Angel & Co., 19 cs. from London; E. Fougera & Co., 54 cs. from Bordeaux and 58 cs. from Bremen; J. Mannheimer, 160

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Paper manufacturers who rely on Hercules Wood Rosin are assured of a dependable supply that is free from foreign material and is uniform in color and quality. More than this, they are offered the cooperation of a large and well equipped chemical organization with an interest in Hercules products that does not stop when the sale is made.

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San Francisco, Calif. Buffalo, N. Y.
Chattanooga, Tenn. Duluth, Minn.
Birmingham, Ala.

HERCULES
Naval Stores
Produced Under Chemical Control

WYCKOFF WOOD PIPE

PRESSURE PIPE THAT NEVER BURSTS.
Built in sizes 1 inch to 48 inches.

The Paper Industry is successfully using thousands of feet of this Pipe and they find it to be the best conveyance for Paper Stock and Acids that can be obtained.

The Pipe of Service

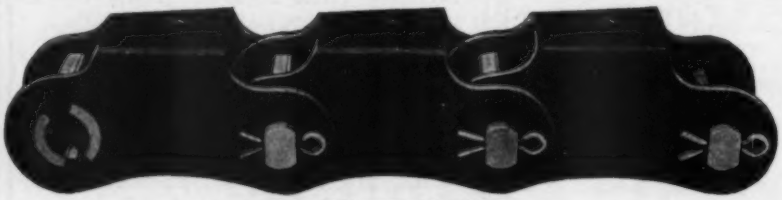
DURABLE—ECONOMICAL—EASY TO INSTALL

Built of selected Canadian White Pine, Wyckoff Wood Pipe is wound with steel bands whose tensile strength is 58,000 to 65,000 lbs. per square inch. The experienced engineer selects a pipe of proven dependability. Wyckoff Wood Pipe, during the past 65 years, has built a reputation that stands the keenest competition. It has been, during this time, the choice of the largest pipe users in the world. We also manufacture a high grade underground steam pipe casing.

Write today for catalog and prices

A. Wyckoff & Son Company

1855 Elmira, N. Y., U. S. A. 1923



"The Chain of Double Life"

Why Double Life?

When the pins and bushings in Union Steel Chains are considerably worn on the one side they can be turned half a revolution, thus bringing their unworn sides into service and practically renewing the chain; later they can be replaced with new wearing parts at small expense. Union Steel Chains invariably give longer service per dollar of cost; that's why they are used by the leaders in all industries.

UNION STEEL SPROCKET CHAINS

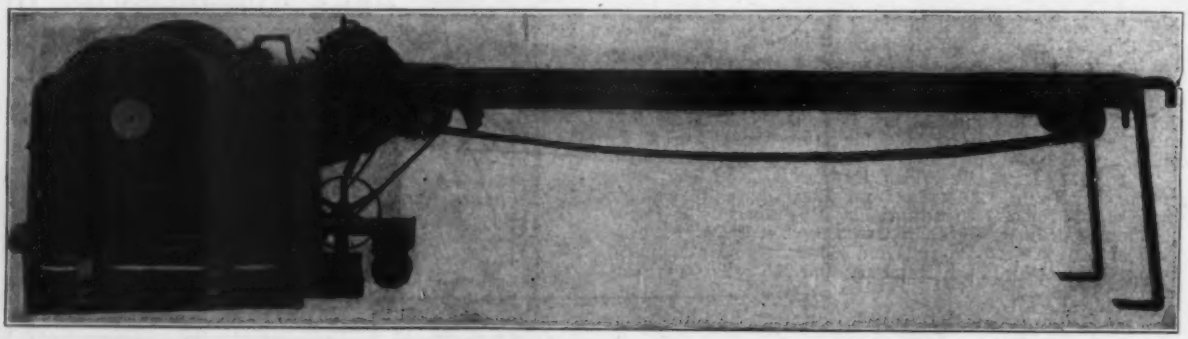
The chains with the substantial links and large case-hardened bearings. All sizes and capacities from one-inch pitch to 1,000,000 pounds ultimate strength.

Roller Chains; Bushing Chains; Elevator Chains; Conveyor Chains; Barking Drum Chains; Monel Metal Chains and Elevator Buckets; Cast Tooth Sprockets; Cut Tooth Sprockets; Renewable Tooth Sprockets; Elevating and Conveying Machinery

THE UNION CHAIN & MANUFACTURING COMPANY SANDUSKY, OHIO, U. S. A.

Registered UNION Trade Mark

No. 11 "GIANT" PAPER STOCK CUTTER



Capacity 2½ Tons Per Hour

Especially Adapted for Handling Waste Paper, Magazines, Etc., Before Feeding to the Beaters

Whatever You Cut, A GIANT Will Solve Your Problem

LET US FIGURE IT OUT FOR YOU

TAYLOR, STILES & COMPANY, Riegelsville, N. J., U.S.A

WATEROUS ENGINE WORKS
Brantford, Ont., Canada
Canadian Representatives

R. J. MARX
133 Finsbury Pavement, London E. C.
Sole Agents for Europe

bls. from Southampton and 23 cs. from Havre; Magnus, Mabee & Reynard, 19 cs. from Bordeaux.

Tissue

C. H. Wyman Shipping Co., 16 cs. from Liverpool; F. C. Strype, 33 cs. from Liverpool; G. W. Sheldon & Co., 5 cs. from Liverpool; Meadows, Wye & Co., 14 cs. from London and 11 cs. from Liverpool; Milton Snedeker Corp., 10 bls. from Liverpool.

Photo

M. G. Lange & Co., 56 cs. from Bremen; J. J. Gavin & Co., 2 cs. from Liverpool; Gevaert Co. of America, 63 cs. from Antwerp; A. F. Rolson, 1 cs. from Hamburg.

Hanging

A. C. Dodman, Jr., & Co., 5 bls. from Antwerp, 39 bls. from Liverpool and 10 bls. from Southampton; A. Murphy & Co., 9 bls. from Southampton, 2 bls. from Havre, 35 bls. from Liverpool and 27 bls. from Hamburg; G. W. Nellas & Co., 111 bls. from London; W. H. S. Lloyd & Co., 266 bls. from London and 31 bls. from Liverpool; F. G. Prager & Co., 355 cs. from Bremen and 9 cs. from Antwerp; National City Bank, 839 bls. from Bremen; F. A. Binder, 1 cs. from Bremen; R. F. Downing & Co., 31 bls. from London; F. Murray Hill, 5 cs. from Hamburg; Order, 9 cs. from Antwerp.

Board

M. Gottesman & Co., 690 pkgs. from Rotterdam; Borregaard Co., 30 bls. from Gothenburg; Metropolitan Import & Mfg. Co., 145 cs. from Hamburg; Wiebush Calendar Importing Co., 33 cs. from Hamburg; Buschmann Bros., 122 rolls from Hamburg; Bendix Paper Co., 638 bls. from Hamburg; Knauth, Nachod & Kuhne, 15 cs. from Bremen; Coty, Inc., 24 cs. from Hamburg; Alpers & Mott, 15 cs. from Bremen; J. W. Levy Corp., 20 cs. from Hamburg; Houbigant, Inc., 32 cs. from Havre; Order, 76 rolls from Rotterdam.

Miscellaneous

F. L. Kraemer & Co., 29 cs. from London; Japan Paper Co., 99 cs. from Genoa, 19 cs. from Havre and 20 cs. from Antwerp; Whiting-Patterson Co., 18 cs. from Havre and 2 bls. from Stockholm; Birn & Wachenheim, 88 cs. from Havre and 150 bls. from Hamburg; F. B. Vandegrift & Co., 5 cs. from Havre; Independent Forwarding Co., 15 cs. from Havre and 6 cs. from Bremen; M. Spiegel & Co., 23 cs. from Havre; Borden & Riley Paper Co., 12 cs. from Antwerp; Hensel, Bruckmann & Lorbacher, 4 cs. from Hamburg; Tradesmen's National Bank, 6 bls. from Hamburg; M. G. Lange & Co., 22 cs. from Bremen; A. Frankan & Co., 15 cs. from Bremen; Banograph Co., 31 cs. from Hamburg; Coenca-Morrison Co., 3 cs. from Havre and 27 cs. from Hamburg; Davies, Turner & Co., 3 cs. from Havre; Robold & Co., 13 cs. from Havre; Fuchs & Lange Mfg. Co., 4 cs. from Bremen; Charles W. Williams & Co., 35 cs. from Antwerp; W. J. Byrnes & Co., 2 cs. from Bremen; G. A. Vedovi & Co., 6 cs. from Genoa; J. Munroe & Co., 4 cs. from Hamburg; G. W. Sheldon & Co., 4 cs. from London; Baldwin Shipping Co., 12 cs. from Hamburg; P. H. Petry & Co., 14 cs. from Hamburg; J. Delbourgo, 9 cs. from Havre; Judson Freight Forwarding Co., 17 cs. from Havre.

Foreign Trade Opportunities

Additional information regarding the following foreign trade opportunities issued by the Bureau of Foreign and Domestic Commerce of the United States Department of Commerce may be obtained from the Bureau in Washington, D. C., or its branch offices. It is requested that the number of the inquiry be given at all times.

No. 5627—Wall paper, Bolivia. Purchase and agency desired. Quotations c. i. f. Antofagasta or Arica, Chile, or Mollendo, Peru. Correspondence in Spanish.

No. 5676—Paper and papier-mache dishes, etc. Norway. Purchase desired.

No. 5687—Wall paper. Bolivia. Purchase desired.

No. 5707—Thick wrapping paper, 44 by 656 centimeters, reams of 400 sheets, 10 reams to the bundle, weight 6½ kilos; and thin paper for wrapping bread. Mexico. Agency desired. Quotations c. i. f. Mexican port. Terms: Cash against documents. Correspondence in Spanish.

No. 5788—Stationery. Ceylon. Purchase desired. Quotations c. i. f. Ceylon port.

No. 5822—Chemicals, such as salt cake, bleaching powder, aluminum sulphate, soda ash and caustic soda, sulphur and rosin. Finland. Agency and purchase desired. Quotations c. i. f. ports of Finland. Terms: Net cash against documents.

No. 5846—Paper for printing and bookbinding trades, and paper stock. Canada. Purchase desired. Quotations f. o. b. place of manufacture.

No. 5859—Paper bags and wrapping paper. Cuba. Agency desired. Quotations c. i. f. Cuban ports.

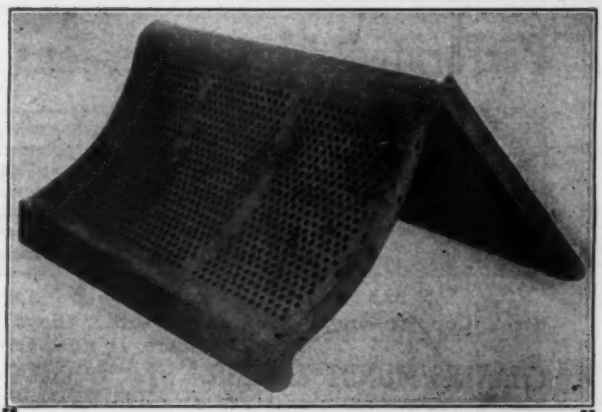
FLY BARS
of BRONZE

Will outlast steel bars 5 to 1
Will not discolor paper stock
Are tougher and stronger than steel
Will not corrode
Will save money in operating costs
Tensile strength, 75,000 lbs. Yield Point, 38,000 lbs. Elongation, 20% in 2 in.

Hy-Ten-Sl Bronze Bars for Jordan Engine Fillers

Outwear anything on the market, by a wide margin.
This metal is as strong as Nickel Steel.
Tensile strength, 110,000 lbs. Yield point, 60,000 lbs. Elongation, 12% in 2 in.

AMERICAN MANGANESE BRONZE CO.
Holmesburg—Phila—Pa.
NEW YORK OFFICE: Room 806, 50 Pearl Street
CLEVELAND: 506 Leader-News Bldg.
PITTSBURGH: 906 House Bldg.



Because there are no moving parts this is a very simple but very efficient device. Patent No. 1,271,426 issued to Mr. Brownell Buehler, July 2nd, 1918.

The Shartle Continuous Beater Company
MIDDLETOWN, OHIO

Remember

WM. A. HARDY & SONS

FITCHBURG, MASS.

Originators and Oldest Manufacturers

OF THE

Cast Bronze Screen Plate

ALSO SPECIALIZE IN

Acid Resisting Digester Parts

SCREEN PLATES *and* **DANDY ROLLS**

Watermarking a Specialty

Central Manufacturing Co.

The Quick Service House

KALAMAZOO MICHIGAN

PERFORATED METAL SCREENS

in all metals for pulp and paper mills
Elevator Buckets (Plain and Perforated)
Conveyor Flights and Trough
General Sheet and Light Structural Work
Light and Heavy Steel Plate Construction
Write for perforated metal handbook

HENDRICK MFG. COMPANY

Main Office and Works 51 Dundaff Street Carbondale, Penna. | 30 Church Street New York City | 544 Union Trust Building Pittsburgh, Penna.

UNION SCREEN PLATE CO.

Fitchburg, Mass., U. S. A. Lennoxville, P. Q., Canada

UNION BRONZE SCREEN PLATES

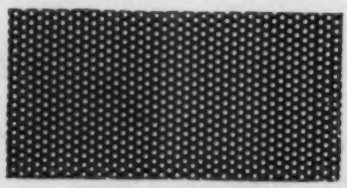
(Best phosphorized Cast Metal)

Old Plates RECLOSED and RECUT to accurate gauge
UNION BRONZE SCREWS for Screen Plates
Immediate Delivery of the Largest Orders. Satisfaction Guaranteed

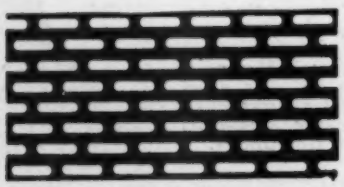
The Witham Screen Plate Fastener, Patented

THE ORIGINAL THE BEST

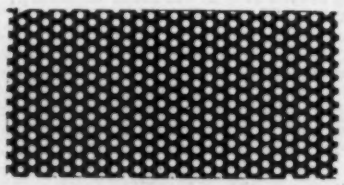
Perforated Metal Screens for Pulp and Paper Mills



.065 inch round



⅛ x ½" Slots



3/32 inch round

Steel, Copper, Brass, Bronze and other alloys punched for Centrifugal and Rotary Screens, Pulp Washers, Drainer Bottoms, Filter Plates, etc.

CHARLES MUNDT & SONS 57-65 Fairmount Avenue, Jersey City, N. J.

WE-FU-GO AND SCAIFE

WATER

PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES

WM. B. SCAIFE & SONS CO., PITTSBURGH, PA.

Beginning New Educational Campaign

The story of the manufacture of coarse paper and paper bags is to be fully described in a series of mailing pieces now being sent to the paper trade by Union Bag & Paper Corporation, New York City.

This company, which is one of the largest in its particular field, maintains its own sources of supply and has some five paper mills and four factories devoted exclusively to the manufacture of coarse paper and paper bags. The campaign contains essentially first-hand information—especially information that should be extremely valuable in giving paper jobbing salesmen a better understanding of their product.

The manufacture of paper bags and wrapping paper is interestingly described in its entirety, from the time the spruce log is cut until the paper bag is ready for use by the retailer. The scope of the story may be measured by the apt phrase, which someone recently applied to it, "From Forest to Counter." Each unit describes a particular step in the process.

The Standard Paper Mfg. Co., Richmond, Va., is to build a two-story plant addition, 64x110 feet, at an estimated cost of $35,000. Wise Granite & Construction Co. of Richmond has been awarded the contract, and M. E. Wright, also of Richmond, is the architect.

The Pittsburgh office of the Central District of the Cutler-Hammer Mfg. Company, Milwaukee, on May first will move to rooms 950 to 953 Century Building. Mr. A. G. Pierce is manager of the Central District, with headquarters in Pittsburgh.

A mill equipped to make pulp and paper from cotton linters is nearing completion in Commerce, Texas. This is the plant of the Trinity Paper Mills Corporation. The finer grades of book and writing paper will be made.

The Celotex Co. at Marrero, La., is drawing up plans for tripling the size of their plant. It is planned to start the construction of same within the next sixty days. C. F. Dahlberg is general manager of the plant.

After a shut-down of about two years the Hinckley Corp. of Hinckley, N. Y., is arranging to resume operations. Preparatory thereto a number of improvements will be made, including repairs to machinery.

New equipment which is estimated to double the capacity of the mill is being installed by the Oregon Pulp and Paper Company, Salem, Oregon. The cost of this new equipment is estimated at about $75,000.

The Detroit Sulphite Pulp and Paper Company, Detroit, announce the opening of an office at 342 Madison Avenue, New York City. Mr. Theodore H. Donlan will take charge of the new office.

The Judd Paper Co. of Holyoke, Mass., is at this time considering plans for the erection of a new building. Estimated cost about $75,000. George P. B. Alderman of Holyoke is the architect.

The Kalamazoo Vegetable Parchment Company, Kalamazoo, Mich., is at this time offering, through The Union Trust Company, Chicago, $1,750,000 of 6 per cent bonds, dated March 1, 1923.

The Ireland & Taub Paper Company, of New York City, has been incorporated under New York State laws with a capital of $50,000 by A. J. Lenon and Y. E. Stahl to deal in paper.

The Potdevin Machine Company, manufacturers of paper bag and gluing machines, of Brooklyn, N. Y., has filed notice of an increase in capital stock from $100,000 to $500,000.

The Hammond Bag and Paper Company, Wellsburg, W. Va., are at this time building a new rope and paper mill and bag factory, according to recent reports.

A recent fire in the plant of the Garrett-Buchanan Company, Philadelphia, did damage to the extent of about half a million dollars.

It is reported that the Wausau Paper Mills Company of Brokaw, Wis., will build a new dam a short way below their old one.

Stevens Tank and Tower Co.

9-23 Center St. - - - - - - Auburn, Maine

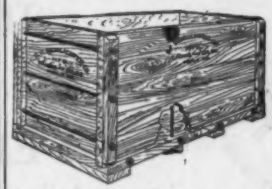
Wooden Tanks, Tubs, and Vats

Wooden Penstocks, Acid Towers, etc.

Inbuilt strength and durability are features of all products manufactured by this company. Handy pocket size catalog mailed upon request.

Established 1893

Wood TANKS and VATS

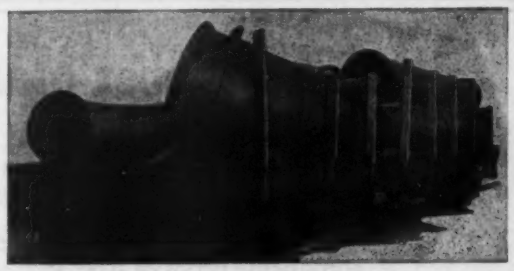


All Kinds and Constructions for Every Purpose

Our Factory, Material, Service and Prices are to Your Advantage

E. F. SCHLICHTER CO.

10 S. 18th Street, Philadelphia, Pa.



When in need of penstock work, pressure or storage tanks, boilers and breechings, specify Manitowoc. This work receives the same careful attention as the construction of Manitowoc digesters, and cooking boilers. Plates are carefully shaped, accurately fitted and securely riveted—by experienced workmen.

Let us bid on your requirements

Manitowoc Engineering Works

Designers and builders of Disc Evaporators, Diffusers, Digesters, Cylindrical and Globe Rotary Cooking Boilers, Experimental Digesters, Paulson Barking Drums, Howard Refiners, Autoclaves, Incinerators, Wash Tanks, Caustisizing Tanks, Blow-pipes, Bleach and Clay Mixtures, etc.

MANITOWOC, WISCONSIN

DENSIMETER—A New Instrument for Paper Mills

A shop instrument for determining the density of rubber in accordance with a standard scale. Can be used in conjunction with a plastometer as its reading multiplied by two will give the plastometer reading. This is a rugged scientific instrument designed for use in the mill as well as the laboratory, and although it was primarily designed for testing rubber rolls, it may be used for testing any other rubber articles. It is suitable for testing rubber rolls in place in the machine in which they are used.

Send for Bulletin No. 124

STOWE & WOODWARD CO. The Rubber Roll Makers
Newton Upper Falls, Mass., U. S. A.

THE WATERBURY FELT CO.
SKANEATELES FALLS
New York

FELTS and JACKETS

Top and Bottom Wet Felts for board machines, with all the qualities requisite to insure long life and continuous production.

They Satisfy

Ask Any Paper Manufacturer!

For thirty-two years we have supplied America's leading paper mills with Pulp, Cylinder, Harper, Fourdrinier and Press Felts.

This long period of continuous service offers convincing proof of Appleton service and quality to discriminating buyers. Let us explain further as to how we can help you. Write—

APPLETON WOOLEN MILLS
Appleton, Wisconsin

Appleton
Felts and Jackets